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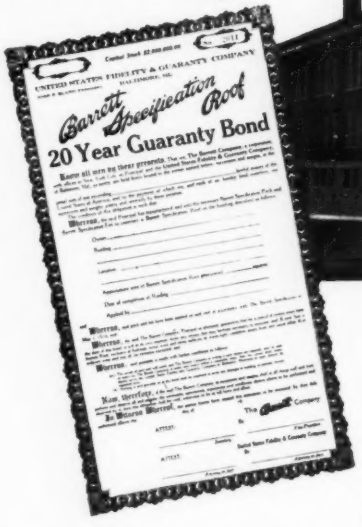

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WESTMINSTER CATHEDRAL.—After the etching by Henry Winslow

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Shadows and Straws

NO FIGHT AGAINST THE Omnibus Public-buildings Bill has ever assumed such proportions and intensity as that which now engages the attention of Congress and the entire reading public of the United States. The attacks are not by any means confined to the laity. Representative Frear, of Wisconsin, spoke at length on January 7. His remarks have not been exceeded in the vigor of their denunciation, and they may be epitomized in the following:

"I speak in opposition to the pending $35,000,000 public-building bill which we are told will pass at this session. Judging from past experience the bill will be loaded down at the other end of the Capitol with from $5,000,000 to $10,000,000 more 'Government monuments,' so that it promises to rival the $43,000,000 river and harbor pork barrel passed at this same session of Congress. The last public-building act was rushed through the House under suspension of the rules. Only twenty minutes were given the opponents of the bill in which to discuss a bill of fifty pages, containing between 400 and 500 items, appropriating over $40,000,000, and covering extravagant and worthless projects from one end of the country to the other. The House and the public were blindfolded as to facts, and then bound and gagged by a vote of 154 to 30 to stifle discussion."

Mr. Frear's reference to loading the bill down "at the other end of the Capitol," is intended to point out the fact that the Senate has a large share and a large responsibility in this pork-barrel legislation. As indicating at least one opinion in the House over the question of slices and as evidence of the little antipathies which are always aroused by divisions of spoils, we quote from a speech by Representative Borland, of Missouri, at the passage of the 1913 bill:

"The bill contains perhaps less than a score of items that can be attacked on any ground of just criticism out in the country, but contains nearly $10,000,000 hogshead of pork for the District of Columbia. We are compelled to submit to this unjust criticism from one end of the country to the other of having prepared a pork-barrel bill, when there is not a member of this House that has got more than a slice of side meat compared with this hogshead of pork (Senate amendments). I am disgusted with this high-handed attempt to not only get the lion's share of the pork, but to load all the odium upon the House of Representatives."

AT THAT SESSION IN 1913 to which Mr. Frear alludes, Representative Fitzgerald, of NewYork, Chairman of the Committee on Appropriations of the House, said, "I denounce as indefensible this method of passing a public-building bill. . . . It cannot be defended from any standpoint of public necessity."

In 1913, criticism of the public-buildings bill reached such a height that Congress appointed a Public Buildings Comission to investigate and report upon the method of making appropriations. Its conclusions follow:

"A general examination of sites and buildings authorized but not consummated has been made and the Commission is satisfied that some appropriations have been made which are not justified. Other authorizations are too large. These authorizations were, it is believed, the result of the present unsatisfactory system of providing for and constructing public buildings."

Postmaster General Burleson, a member of the Commission, submitted a minority report which was as admirable in the lucidity of its analysis and the directness of its criticism as the majority report was weak. From his remarks we quote as follows:

"The absence of clearly defined policies with respect to the construction of public buildings is largely responsible for the delay in authorizing projects under contract. No standards whatever have apparently been observed in authorizing buildings or fixing in advance the limits of cost. As a consequence many expensive buildings have been authorized for places where the needs of the Government do not warrant their construction and widely varying limits of cost have been fixed for buildings for which the needs are about the same. . . . It is clear that limits of cost have not been based on any uniform standards and that the wide variations are indefensible. The inconsistency of the legislative authorizations has not been remedied by the exercise of executive discretion. It has been the practice to approximate the entire appropriation in expenditures for the construction of the buildings authorized. This has necessitated separate treatment in the majority of cases and has restricted the output of the Supervising Architect's office to the minimum. It has also resulted in the erection of monumental buildings out of all harmony with, and greatly exceeding in cost, other buildings in the same localities. Frequently the plan of a public building has been made to include a second story, practically all the rooms in which have remained unassigned, showing clearly that there was no good reason for the provision of this space. The remedy for this condition . . . lies in the adoption of a new public-buildings policy."

In his annual report for 1916, the Secretary of the Treasury stated that as a result of his three years' study of the public-building question, he was convinced

"that the methods pursued by the Congress for the past fifteen years of providing federal buildings through so-called omnibus public-building bills have resulted in the construction of many public buildings in small towns and localities where they are not needed, and at a cost which is clearly unjustified by any actual requirements of the communities in which they are erected. The conclusion is irresistible that authorizations for public buildings in these small communities are too frequently dictated by local reasons and without regard to the best interests of the Government."

BEFORE TURNING TO THE PRESENT omnibus public-building bill, it may be well to say that the Treasury Department has undoubtedly made progress in trying to effect some economies in the purchase of sites and in using its discretion as to the amount to be expended on buildings. But neither real economies nor any sound architectural development are possible under the present system. The amazing situation in the office of the Supervising Architect is disclosed in his annual report of June 30,1916. The work accomplished during the year previous makes the following record, and supports our demand for an expert commission:

"Placed under contract during the year:

Buildings (including the Interior Department office building and the central heating, lighting, and power plant)	88
Extension and remodeling projects	8
	96

"Completed during the year:

Buildings	94
Extension and remodeling projects	7
	101

The amazing part of the situation is revealed in the following summary:

Buildings authorized prior to act of March 4, 1913, and not under contract June 30, 1916	20
Buildings authorized in act of March 4 and June 23, 1913, and not under contract June 30, 1916	248
Building authorized in act of March 4, 1915 (Forsyth, Georgia)	1
	269

On June 30, 1916, there were thus 269 buildings awaiting the making of plans and the preparation of specifications in the Supervising Architect's office!

It is therefore apparent that any buildings authorized at the present session of Congress cannot be undertaken before the year 1920, at the present rate of progress. By that time the conditions of every one of the projects will have changed materially and an appropriation will bear less relation than it does now in the present helter-skelter method of fixing a figure. If the bill itself were not indisputable evidence of its own pork-barrel character, the most complete and perfect testimony to that effect is disclosed by the fact that the Committee on Public Buildings is proposing to appropriate money for buildings, the first of which cannot possibly be begun for three years, and built only at a rate which will make every appropriation obsolete before a plan is drawn. Again we point to these conditions as one of the paramount reasons why the public-building policy of the United States should only be determined after a thorough investigation by an expert commission. Appropriating money is only a part of the problem. Planning and constructing the buildings promptly are also vital factors.

THE PRESENT BILL is known as H.R. 18994, which is a revised version of H.R. 17052 and its supplementary escort H.R. 17188. This latter, merely added a few items to its predecessor and

increased the amounts of other items. H.R. 18994 includes these additions and some new ones amounting to about $400,000. Lewistown, Illinois; Oswego, Kansas, and Plymouth, Pennsylvania, are given buildings where they had only sites in the previous bills. Lenoir City, Tennessee, with annual postal receipts of $6,460 has the cost of its site increased from $6,000 to $10,000. Millen, Georgia, with annual postal receipts of $5,000, gets $5,000 for a site. The large items are an increase in the appropriation for the post office at Fort Worth, Texas, of $100,000, and $60,000 for additional land for the site at Waco, Texas. Such political significance as may attach itself to these post-election changes in the bill is left as a subject for individual speculation.

On submitting H.R. 18994 to the House, Chairman Clark of the Committee on Public Buildings and Grounds of the House also presented a report numbered 1222, and dated December 16, 1916. It appears to be identical with the report originally submitted in connection with the earlier bill known as H.R. 17052 and offers an excellent example of the obscurity on this question which so generally prevails. Excerpts from it also may be useful in clarifying some of the defensive arguments which have from time to time been put forth in support of the method followed by the Committee on Public Buildings and Grounds in making up the omnibus bill.

From this report we find that

"It will also be noted that the bill carries a provision for the construction at such places where only the postal and civil service needs of the Government are to be taken care of, of factory or block type of buildings capable of being enlarged and added to as the necessities of the service may require. It has been the custom of the Government in past years to construct in small cities and towns magnificent buildings of stone and marble, which were entirely out of place and not in keeping with the surroundings, and in a great many places totally unfitted for the purpose intended. It is the view of this committee that a post office should be essentially a workshop and that it should be constructed with a view to efficiency, economy, and the comfort of the employees. . . . We believe that the time is past, and, in fact, it never should have existed, when monumental buildings should be constructed for the conduct of the postal business of the United States. As stated hereinbefore, the Committee is decidedly of the opinion that the post office should be essentially a workshop, with plenty of light, air, and space in which to efficiently and economically transact the business of the Republic."

This statement is of especial interest when contrasted with the words of Mr. Clark, spoken upon the floor of the House on January 17, 1916, or about eleven months earlier than the report from which we have just quoted:

"I hold no brief for the Committee in what I am about to say, but speaking for myself alone, and as an individual member of this great body, I want to say that there are some other considerations which move me and operate upon my mind when giving attention to the matter of constructing Federal buildings in the smaller cities and towns and particularly those of the interior. . . . If I had the power I would erect for every presidential post office throughout the broad domain of the Republic a Government building representative of the sovereignty and the glory of this great country. From Maine to California and from the Great Lakes to the Gulf, in every town of sufficient importance to have the President name the postmaster, I would erect a suitable but not extravagant building and from its apex the Stars and Stripes, proud emblem of the glory of the Republic, should forever wave an inspiration to the youth of the land. Suppose that here and there it should be a little more expensive in dollars and cents to own a building than it is to rent. Is it worth nothing to inspire patriotism and love of country in the hearts and minds of the youth of the country? No youth or citizen ever looked upon a Federal building in which the business of his country was being conducted but that he became a better American."

This moving plea, so unconsciously naive in its fundamental appreciation of architecture, concluded with an oration upon the beauty of the Capitol and three lines from a well-known poem. Yet, eleven months later, the "factory or block type" of building is proposed and the youth of the country are to go unblessed by the vivid emotions aroused by a contemplation of our present post-office style of architecture!

The Bill of 1913 contained this clause:

"That hereafter no authorization shall be made for the construction of a building to be used exclusively for post-office purposes at any town or city where the postal receipts have not reached the sum of $10,000 annually, nor shall any authorization for the purchase of a site for post-office purposes only be made at any town or city where the postal receipts have not reached the sum of $6,000 annually."

This law, which is a mere subterfuge, does not apply where other governmental activities are to be housed in the post-office building, and the exception offers a basis for extravagances which will be defended as "under the law," by the sponsors of the present public-buildings bill, which includes many small towns where the postal receipts are below the $10,000 prescribed.

The present bill contains the following provision:

"That from and after the passage of this act no city or town in the United States where there are no Federal activities other than the post office shall be considered, either for the purchase of a site or for the construction of a Federal building, . . . unless it shall appear that the postal receipts for such a city or town have amounted to at least $10,000 annually for three successive years: Provided, That nothing herein shall apply to cities or towns where sites for public buildings have been acquired or authorized."

That last clause may probably be construed as protecting the interests of those towns which may never reach the necessary $10,000 limit, but which have in this and previous bills been able to get an appropriation for a site.

While it may be contended that these laws exhibit a tendency to reduce public building appropriations to a business basis, it is evident that the mere framing of such arbitrary standards is nothing more than a concession wrung from Congress by a nation which is beginning to understand that politics has become an end in itself, and that oil for the political machinery —not ignorance of business methods—is the real source of the polluted stream of Congressional extravagance.

THE CHAIRMAN OF THE COMMITTEE said in the House on Dec. 21, 1916:

"Two objects are involved in the fight upon this bill. One is to take the jurisdiction to legislate away from Congress and turn it over to a bunch of bureaucrats, giving them a lump-sum appropriation and allowing them to say where the buildings shall go; and the other is to defeat this bill and later on come to the Committee with a lot of emergency propositions for the great cities and force us to bring out a bill covering them only. As one member of this Committee, and only one, I want to say I shall never vote for a bill that contemplates only the great cities of the country. If the rural districts cannot be taken care of and their mail facilities cannot be protected, as one member of the Committee, I will never bring out a bill to take care only of the great cities of the land."

As to the first of these objects, we think there is no opponent of the present method of making public-building appropriations but that would frankly avow his belief that the right to administer appropriations should be taken away from Congress. Not the right to legislate, but the right to designate, is the principle involved. The power to grant money for public buildings cannot be taken away from Congress, but the right to say how the money shall be spent does not belong to it, and the abuse of that extra-Constitutional privilege is responsible for extravagances that only the wealthiest nation in the world could shoulder. As to where should go the right to designate what public buildings should be erected under an appropriation based upon a budget allowance, no one cay say. It would be part of the work of such a commission as we advocate to determine the business basis upon which such problems should be met and solved, and until that business basis is determined the extravagance will continue.

Congress will fight to the last ditch to retain the power of designating what buildings shall be built. It is a vital wheel in the political machine which is being ever more perfected. It is one of the important works which protects Congress against the adoption of the budget system and the consequent loss of the huge political power it has built up, always, be it remembered, with the approval of the voters. Congress scents in the opposition of the Treasury Department to the public-buildings bill an effort to obtain control of the power of designating where public buildings shall be built. That this is plain is evidenced in the speech of Chairman Clark which we have quoted. The "bunch of bureaucrats" is a very plain insinuation. So is the similar reference by Speaker Champ Clark of the House, in a letter to the *New York Times* published on December 28, 1916, from which we quote as follows:

"For several years I have been trying to devise a better scheme of erecting public buildings than we now have. I have contended for a long time that there ought to be fixed conditions on which public buildings would be erected automatically—conditions as to postal receipts. I am utterly unwilling that such things should be disposed of by any Cabinet Minister who is simply a head clerk to the President."

As to the second object said to be involved, we trust that the cry of sectionalism, raised like a red flag whenever a national issue is at stake, will pass for what it is. Is such the language of one who seeks to meet a business problem in the best interests of the nation as a whole or is it the protest of one who scents an assault upon the sacred privilege of dealing out perquisites under our system of appropriating money?

ONE SERIOUS ASPECT of the present bill seems to have escaped notice. We do not find that the Treasury Department has pointed out that

the $39,000,000 involved is not a charge against the revenues for the year 1917. We have seen no statements anywhere to illumine the even more serious nature of the situation. It is improbable that more than $5,000,000 to $7,000,000 of the $39,000,000 carried in the pending bill would be expended during 1917, and that almost entirely in the purchase of land. The balance of the appropriations is a liability imposed upon succeeding administrations, and is met year by year as construction actually ensues. Comment upon such a method of Government finance seems unnecessary.

In our protest at the present methods of appropriating money for public buildings, we have endeavored to point out that communities are equally to blame. As a matter of fact, they are more to blame, for by their tacit acceptance of the method involved they encourage Congressmen to believe that it is approved by their constituents and that their possible reëlection will hinge upon the size of the favors they are able to extract from the nation's treasury.

Every community affected in the bill ought to rise as one man and proclaim its refusal to participate in a distribution of public money based upon so palpable a lack of ordinary business foresight. No matter how dire its needs, there should be unanimous resentment at the method involved. What a wonderful thing it would be? How perfectly it would demonstrate that we are really a united nation! That national citizenship does exist! That Congressmen are elected to serve the nation's welfare and not as special pleaders for each community's selfish interests! It is in the mirror of their own civic conscience that the citizens of the un-United States must look if they would understand "pork."

The fight against the Omnibus Public-buildings Bill is only one minor operation in the bigger battle against a snugly intrenched machine, fortified behind that provincialism and sectionalism which pervades the nation, and which tacitly, if not openly, acquiesces in the betrayal of the country when a local selfish issue is involved.

A Depressing Feature of the controversy over public-building methods is the lack of any apparent comprehension of the relationship which architecture should bear to the physical needs of housing Government functions. The allusions to the architectural element, in the press, have been pretty generally confined to sarcastic comments on "monuments," "marble palaces," and such other exhibitions of superlative democracy as have seemed best suited to convey an idea of extravagence in expenditure and an impressive disdain of all things "impractical." The city has howled at the village and the small town; they have replied in kind. The cry of unfairness in distribution has been raised in Congress, echoed throughout the land, and re-echoed in Washington. The vital principle at stake has been lost to sight by cities and towns alike. The cities point out their large postal receipts and demand relief from annoying congestion and vexatious delays. The country places proclaim their right to consideration and accuse the large communities of selfishness and inconsideration. It reads like the tale of a scramble for largesse, rather than a discussion of a national issue which is a matter of business and nothing more, so far as the terms are concerned, and might well lead the stranger in our land to ask what "united" means.

The present issue will perhaps be decided before the Journal reaches its readers. It is reported in Washington that the bill will be passed, and it has likewise been stated by the President, according to press reports, that he will veto the bill if it passes in its present state. We may be able to say something much more definite in the February issue.

THE NECESSITY for economy of paper, together with a desire to have the text pages of the Journal printed upon an uncoated paper surface, have led to changes in the makeup of this number. These include, also, a slightly larger type page, as a measure of paper economy, which has the merit of permitting correspondingly larger plates. The beginning of the Structural Service Department has also been a factor in what are, we believe, to be highly desirable changes, and marks a most important step in the work of the Journal. The measure of its appreciation has increased at a rate which leaves no doubt of the future, and Volume V steps out upon the road with a light heart.

WITH FERVOR, we wish that we might record the demise of the threadbare figure "Educating the public." Reduced to rags and

tatters, the sorry spectacle still totters tremblingly on its way, gathering a little compassion and comfort as it persuades ambitious beings to take up the cry. To ears which have been dulled into insensitiveness by the passionate preachments of this reformer and that; to eyes which have been seared with the sordid "educational" efforts which litter our highways, infest our streets, disfigure our buildings and premiate a general ugliness, there come occasional dreams of an uneducated world where everyone would be content to pursue his own education unmindful of the dense ignorance that now troubles the conceited estimation with which so large a share of the public now regards itself. We recall the memorable "Epistle to the Cymry" of George Moore, and his simple exhortation, "Let us educate ourselves, but be not educated." That epistle would bear a wide reading.

Perhaps never was the word "education" so given over to controversy and speculation. Representing, as it does, a process which begins at birth and is unfinished at death, it has become much confounded with instruction, which is quite a different matter. The Institute now sees, we believe, that both the education of the architect, the client, and the far larger class which may never indulge in building but whose appreciation is so dearly coveted, is a problem which is not easily resolved into separated and isolated phenomena.

We fancy that it is also beginning to be seen that the approach to the problem is through cultivated coöperation with all the agencies that are soberly addressing themselves to the stupendous task of finding out, not alone how to educate, but for what purpose we desire to educate. There are some who have grown to believe that it is the last question which must be answered first; that before we seek remedies we should search out objectives, and that those objectives will be found to lie spiritually deeper than the mere making of clever producers and intelligent consumers. Both are desirable, but there are other things more desirable, and we are glad that occasion permits us to reprint in this number the memorable address by Mr. LaFarge at the Convention in Minneapolis*. It is by way of being an approach to the task ahead of us, as is the following article by Mr. Bosworth. We feel that the Journal is able, with their generous aid, to make a worthy contribution to the preparatory steps which cannot be avoided or lightly skipped over, if there is to be any intelligent following of the path, and we bespeak for these articles a much more than passing attention; they direct the probe into the very roots of our hopes and fears as a nation ostensibly bent upon a high mission, in the fulfillment of which the fate of our architecture is indissolubly bound up.

*"Education and Public Taste," p. 9.

Eight Etchings by Henry Winslow

TO THE readers of the Journal Mr. Henry Winslow needs no introduction, for his articles on John Ruskin, Eugene Isabey, Richard Parkes Bonington, and Samuel Prout, have perhaps not been excelled in the keenness of their analytical quality and in the sureness with which he has placed each of these great interpreters in the long line of draughtsmen to whom architecture held a never-failing appeal. From time to time Mr. Winslow has sent us a few sketches with which to illustrate some of his earlier letters from London. Doubtless there are many who will recognize in the present etching of St. Paul's a likeness to the pen-drawing by Mr. Winslow which we published some three years ago, while others are already familiar with his earlier etchings.

Mr. Winslow went to Paris in 1893 and studied architecture for five years in the Redon atelier. At about this time Whistler opened his school and gave a new impetus to etching; Mr. Winslow was one of the first to enter, and one of his first etchings was exhibited at the Salon, but in 1893 he returned to New York and renewed his architectural interests in the offices of Tracy & Swartout, Howells & Stokes, and Robert D. Kohn, later practising for himself. In 1911 he abandoned architecture, and devoted himself entirely to etching and painting. For several years he has been living in London. The eight etchings in this number are published for the first time.

Education and Public Taste

THEY tell a story, which perhaps you know, of a girl who was riding with her mother in a street-car. Her eye caught a newspaper headline and she exclaimed, "O, Ma, the Cam-pa-níle has fallen!" and burst into tears. The beauty of this story of provincial gaucherie and true esthetic anguish over the collapse of that bell-tower which all the world has come to call *the* Campanile, lies in its truth, for it is true whether or not the incident actually occurred. That is, it presents to us a fair picture of two manifest and touching phases of our American life—our singular lack of that atmospheric condition which should be the product of the education we so agonize over, and the unintegrated sensitive yearning for the beautiful, for escape from our plodding vulgarity, which expresses itself in so many and sometimes so quaint ways. About the yearning there can be, I take it, no doubt—on the side of education conflicting counsel darkens wisdom.

It was at first my intention to direct these remarks toward education in the arts—aside from the fact that any specific discourse of mine upon methods of instruction would have to be second-hand, and therefore presumptuous, there is a further difficulty. The more I think of education in the arts, the less I can see it disentangled from general education; the more I become convinced that to make all education contribute to the making of public taste is as great a need as specific improvement in any special training. So it is as a bystander, vexed and confused by discordant clamor, that I must venture to speak.

To hear the clamors, one need not strain the ear. Pick up any current magazine with even the slightest pretension to be counted serious—I leave out the loathsome parasites that feed like clever lice upon metropolitan social uncleanliness, and those whose pages are a tasteless jumble of advertising and exploitation of the cheap god Success—and you will pretty surely find some paper that discusses education.

The pages of the *New Republic* stoutly proclaim the philosophy of John Dewey and the shining promise of Gary; in the broad *Atlantic*, the Headmaster of Andover breaks in a surge of indignant foam againt the opposing wave of Flexner's heresies. Right and left there is contention and divergence of opinion in what we must regard as the struggle to adjust the processes of civilization to new world-conditions, thrusting themselves more sharply upon our attention day by day, gravely accentuated by the terrific European spectacle; to conditions which we apprehend to mean the dissolving of many long-established boundaries; to new and growing conceptions of man's duty to his fellow-men.

Roughly speaking, very roughly and a little inaccurately, we may divide the educational camps into two: the advocates of a broad and general culture as discipline for the mind and a foundation upon which to build special activities, and those who preach a demonstrably direct utilitarian teaching. American educators, students and observant laymen are not the only contenders; the English are as torn by the strife as ourselves. Of other countries I do not know, though what seems to me a very remarkable and illuminating bit of news, to which I shall refer later, comes from Germany—Germany, where they have it all so settled and do it so well.

The distraught bystander, not qualified to form expert judgment upon the merit in detail of any particular scheme, unless perhaps in the circumscribed province of his own calling, cannot very well decide where the doctors so fiercely disagree. Therefore, being interested and concerned, anxious and doubtful, having also an opinion or two of his own here and there, he is driven back upon some generalizations, if only for the purpose of preserving his mental decorum. But if he must, notwithstanding his place outside the ring, yet arrive at some sort of alignment in his beliefs, some crystallization of opinion, he will, I believe, discover that his deposits are being formed on both sides of the dividing line.

For he will, to begin with, realize that the contenders, in their battles with each other, are fighting for the same thing: to make educational processes effective for the conduct of life, to make teaching teach. The humanists, anxious defenders of what they deem, as so many others of us do, a priceless element of all culture against the assaults they fear would sweep it from any real place in our lives, need not therefore be seen as universally arrayed in denial of the value of direct vocational instruction. The vocationists, inveighing against the hopeless unpracticality and waste of what looks to them like a kind of fetishism, are unfairly judged if we consider them unanimously contemptuous of those things that are the enriching fertilizers of the human mind. The opprobrious charges that one side levels against the other, the one saying "Your precious fertilizer is all very well, but it doesn't seem to take hold, it all leaches away;" the other, "Your blessed practicality is wretchedly unpractical; men are not machines and you can't make them such; the narrow product of your narrow teaching is not even good of its kind"—these charges, true enough indeed, not unadmitted by the sincere on whatever side, express, after all, a promising state of general, we may even call it a divine, discontent.

So, then, the bystander will note that a spirit of inquiry, pretty searching inquiry, is abroad in the land; note, too, that it encounters some formidable obstacles. He probably has but a vague notion of the great Italian, French and German foundations upon which the modern educational structure is reared, but he is not unlikely to catch some echoes of current English discussion, which may lead to interesting observations, casting strange lights upon our own. The first of these is that we have really progressed further, all crudities and poorly cooked theories acknowledged, along the road of inquiry than have they, in two respects: one, that it is but recently—perhaps only since the war has brought men hard up against hard facts—that the English educators pleading for reforms have had a public to understand and help them; the other, that they are still chiefly concerned with the practical question, the proportionate place that the classics, literature and history should hold in the curriculum. With us, on the other hand, it is an old story that whoever, expert or otherwise, has had educational views to air, reforms to demand, reactionary stupidities to decry, has appealed to

a widespread, keenly interested public of laymen and eager parents—the eagerness of the latter sometimes resented in high places. It is also, I think true that while the wrangle over curricula still goes merrily on, our expert leaders have given the best of their thought to philosophical probings; to the psychological aspects of the problem—that is to a determination of the fundamentals upon which constructive methods may safely stand. Not that the Englishmen are without this altogether; Holmes' article, for example, on Discipline and Freedom is a thoughtful attempt to define the nature and uses of discipline and a good exposition of child-psychology.

The other observation is more difficult to state, for it is hard to reduce an atmospheric sense to terms. To read any number of English essays on the subject, writings of laymen as well as of professionals, is to feel what I can find no better names for than catholicity and ripeness. Catholicity, in the sense that the controversial writer, damning, let us say, the grotesque unpracticalities flowing from Oxford traditional standards, yet shows so full a sense of the worth of Oxford culture in its proper place; that a deeply sensitive and sensible plea for the classics comes from a teacher of science in a great public school; while one of the most intensely cultured of all headmasters actually proposes the abolition of Latin and Greek. They understand what the adversary means, even when they most sharply disagree with him; they speak a common language. As for ripeness, how shall I say it? You know that these writers, protesting against the methods by which themselves were taught, declaring their absurdities, crying for new things, could by no conceivable possibility write as they write and think as they think were it not for the saturated air of tradition and general culture in which they have been produced. Despite our own further advance in the ways I have indicated, despite the occasional high merit of our own essays, what they say, as you scan the body of it, makes our writings, our speakings —particularly, I dare say, the remarks of bystanders on platforms where they do not belong—of an almost appalling sophomoric thinness. It is a matter of quality, and in one case it is there, in the other not; which is something we might do well to take account of before we decide on the contents of our proposed junk-pile.

The consideration of that highly distinguished scrap-heap is to some extent imposed upon us, because there is a contest, and contests inevitably develop certain manifestations. They produce partisan attitudes which exaggerate the views of the contestants. The reformer, straining to achieve some breach in the wall of conservatism, attacks more things than he probably would destroy could he once have his way. The conservative, alarmed lest essentials should be undermined, and seeing no guarantee of adequate substitutes, tends to become a reactionary. The advocate of new ideas rails against our teaching of the classics; he may not really mean any more than that they produce, as taught, but little visible effect in most cases, but he carries with him all those whose mental horizon is bounded by their narrow conception of practical utility and who wonder of what use Greek and Latin and history are, why anyone should bother about art, who think all beauty a kind of personal extravagance; for to them none of these things is used in making steel or concrete, or paving, or the manufacture of automobiles, or the development of power-sites. They are apt to be the kind who think conservation a sort of iridescent fad. And of course the humanists and all those to whom traditional things are dear, rise in arms against them. The reformers, impatient with shibboleths about mental discipline and indirect results, cry "Prove your case."—the case is naturally a bit hard to prove with any degree of mathematical precision. The bystander, picking up stray trifles of evidences here and there, is struck, for instance, by the German news I spoke of before.

I suppose that nowhere in the world have educational systems been more thoroughly worked out than in Germany. Nowhere has the distribution of teachings designed to produce specified results been more elaborately determined. German efficiency manifests itself in this way perhaps more clearly than in any other. There, more than in any other place, have men been held to a rigid accounting, in the quality of their performance, for the educational benefits they have received from their country. And yet it is from there we learn that "After ten years' experience of the students drawn from Realschulen as opposed to those from the classical Gymnasium the entire scientific professorate of Berlin University petitioned the Government for a return to some classical basis of education, on the ground that they foresaw 'grave danger to the Fatherland' in the uniform inferiority of mental caliber among the students turned out by the entirely modern schools." And if you happen to be so proally that you discount any pronouncement made by a body of German professors, turn to France, where a petition to the same effect was presented by Les Maitres des Forges, "declaring that the students from the new schools, though better equipped in mathematics and science on arrival at the technical school, invariably fell behind the classically trained boys in the later semesters of their course."

Now I want you to let me tell a story—I shall have recourse to stories for my illustrations, because a bystander must perforce depend so largely upon his own limited personal observations. This is about a little boy, some ten years old, who wanted to know why Herodotus was called "The Father of Lies." So his mother, believing that questions should be answered, read some Herodotus to him, explaining as well as she could while they went along, how later knowledge had proved the truth of so many of the old historian's statements. One summer day they came upon this account of the battle of Sardis: "Crœsus . . . . drew out the Lydians to battle; and at that time no nation in Asia was more valiant and warlike than the Lydians. Their mode of fighting was from on horseback; they were armed with long lances, and managed their horses with admirable address.

"The place where they met was the plain that lies before the city of Sardis, which is extensive and bare; several rivers, as well as the Hyllus, flowing through it, force a passage into the greatest, called the Hermus, which, flowing from the sacred mountain of mother Cybele, falls into the sea near the city of Phocæa. Here Cyrus, when he saw the Lydians drawn up in order of battle, alarmed at the cavalry, had recourse to the following stratagem, on the suggestion of Harpagus, a Mede. Having collected

together all the camels that followed his army with provisions and baggage, and having caused their burdens to be taken off, he mounted men upon them equipped in cavalry accoutrements, and, having furnished them, he ordered them to go in advance of the rest of his army against the Lydian horse; and he commanded his infantry to follow the camels and he placed the whole of his cavalry behind the infantry. When all were drawn up in order, he charged them not to spare any of the Lydians, but to kill every one they met; but on no account to kill Crœsus, even if he should offer resistance, when taken. Such were the orders he gave. He drew up the camels in the front of the cavalry for this reason; a horse is afraid of a camel, and cannot endure either to see its form or scent its smell: for this reason, then, he had recourse to this stratagem, that the cavalry might be useless to Crœsus, by which the Lydian expected to signalize himself. Accordingly, when they joined battle, the horses no sooner smelt the camels and saw them than they wheeled round and the hopes of Crœsus were destroyed."

The little boy took exception to this; he did not believe that the horses would be so frightened and thought that this time Herodotus had surely drawn on his imagination, and his mother was not able, at the moment, to produce supporting proof. The next day—the very next day—it happened that the coachman had to go to a village several miles away, and invited the boy to go with him, an invitation promptly accepted. They hitched up a favorite horse, known to be fast and of remarkable good manners and courage, though very high-spirited. They left the highway, and took a back country road, narrow, crooked, exquisitely bordered by the close hedgerows of trees, bushes and aromatic wild grapevines of southern Rhode Island, and on that road the horse suddenly stopped, trembling. Then, round a turn, came an elephant and a camel. The horse, in terror, mastered a strong inclination to sit down, then, quivering like a leaf, edged as close to the bushes as he could squeeze himself, while these members of a country circus passed. He then broke into a profuse sweat, and went along his way. When the boy got home he told the story.

Now what did all that mean to him? Well, that Herodotus was a living author. That the battle of Sardis was a real occurrence which, I venture to say, he will never forget; that those long-vanished yesterdays were tied to these present days in which he lives. A salient fact in natural history and incidentally a place for the elephant and the camel such as no mere science class would ever give them. And, not the least of all, a confirmation and appreciation of that horse's nerve and good conduct that should appeal to any lover of the horse. That much, anyhow; and all from reading a bit of Herodotus. As we look at the struggle going on between those for and against the classics, and those for and against the sciences, in which history somehow seems in danger of slipping out of sight neglected by both, perhaps this story may help those of us who want it to be taught. For though it actually did happen; the boy was my boy; it was my coachman and my horse—I lay no claim to the exotic fauna—it looks to me like an educational parable.

Once more about a boy. If he asks his parent "What was it like for people when they lived in caves?" what should the parent say? Stave him off with some evasive platitude? Or recognize that this was legitimate inquiry? In the case I have in mind, the latter course was taken. The boy was no prodigy; just a normal, ordinary boy with rather a marked tendency to pursue a subject when he got started on it. He is now fourteen years old; he has read all that Scott Elliott and Fairfield Osborn have given us about primitive man, and the other day I saw his list of the things he wants for Christmas: a gun, rifle, bright socks, a red neck-tie, a dog, tin soldiers, and a copy of the book of the foremost living French authority on prehistoric man.

The point of my telling this is not that this young rascal is really very interesting, except to his fond parents. It is partly that it has contained, for those parents, a lesson upon the importance of home environment as an adjunct to what even the very best of schools may do, something too of distrust in their own predeterminations of what are dry subjects for the youthful mind; partly that it leads to questioning whether some of the difficulties of educators, in arousing interest and in achieving retention of the thing taught, do not arise from insistence upon established formulas rather than willingness to seize upon latent motive impulses. For in every normal child there are God-given springs of right curiosity. And the great parting of educational ways lies between choking those springs and aiding their flow. What shall we do? Shall we, for these spontaneous mental fountains of youth, open channels for them to run in, to gather over and about them all the lovely overhanging ferns and flowers that keep them cool and sweet, that we call culture, until at last they water beautiful gardens or fill reservoirs of power; or shall we block them up because they are troublesome and lawless, build hard channels bare of adornment, and then pump the channels full from the good old stale tank of orthodox custom?

The bystander, ignorant and perplexed, himself a kind of concrete ditch frightfully subject to drought, sees that those who have had the vision of the fountain find arrayed against them the guardians of the tank. About this I want again to tell a story—bear with me please. I apologize for its being so personal, and beg you to believe that the passage of the years since its occurrence has relegated it, long since, to the realm of illustration.

Once, when I was young in what seemed a very young world, I found myself in a famous lovely English cathedral, one graced by perhaps the most exquisite of all Lady Chapels. No need to account for its appeal to me, nor for my eagerness to see it.

As an unprivileged tourist, I went into the cathedral to see for the first time its beauties and certain striking singularities of construction, which awakened a keen desire for closer examination than is allowed to stray visitors. I made the appointed rounds with the dull verger and the little group of hypnotized sightseers he shepherded; paid my sixpence, and then lingered. I asked him how I might gain access to the closed parts, but met with no encouragement. Then, as I persisted, he pointed out a man walking in an aisle across the church and said, "That is his Lordship; you might ask him."

I approached the Bishop—a fine-looking, dignified, elderly person in the cloth of his rank. I apologized for intruding upon him; explained that I was an American, curious about this building, fond of its period. I told

him that I was the architect of the new Episcopal cathedral about to be built in New York, and begged permission to go through this one. He looked me over from head to foot as though I were some strange and presumably offensive insect, and said, "Oh, so you're going to build a cathedral in New York, are you? I suppose it'll be the biggest in the world?"

"No," I answered, "not the biggest in the world. It is planned to build a large one, for it is a large diocese, and New York is an important city. This will probably be the chief cathedral of the Episcopal faith in America."

"Well," said his lordship, after a long pause, and another unfavorable inspection, "I think you'd better follow the verger."

I bowed and withdrew.

A good many years passed before, on another visit, I again met him. A part of our cathedral stood on its heights, and the world was not quite so young. Once more I met him in one of the aisles; he was in a recumbent position and had been turned into marble. Neither of us spoke; what he thought, I do not know; what I, is not to be set down here.

This story is one that may be used for the discountenancing of some British, or for the causing of Yankee exultations. Neither use is a worthy one, nor to the present purpose. The one I want to make comes from seeing that those who would reach the ears and the hearts of our fellow countrymen; who strive to appeal to them for the building of a public taste, expecting to meet minds open to ideas and the formation of intelligent fresh opinion; who ask for educational reforms reaching the problem of taste; who seek permission to indicate the ways of symmetry and order, of cleanliness, economy, tidiness, utility, convenience, and therefore beauty—they are told, over and over again in many ways to follow the verger.

Not sympathetic comprehension and interest nor the desire to move forward, but the verger. You know him; you see him—the pottering parrot wearily reiterating forever the same old phrases. In the presence of ancient glories, his tongue chatters and his mind is mute. His steps may not be diverted from the accustomed path nor his pace changed. For him there are no such things as new ideas. For him new glories do not exist or are meaningless, and the possible new splendors of a future day as remote from his conception as man's conquest of the air to Cotton Mather. And *he* is to be our teacher and our guide!

Follow the verger; preach in a vacuum; talk to ears dulled by the ceaseless repetition of catchwords accepted as a substitute for thought; show to eyes dimmed by never looking a fact in the face; depend upon taste assumed to be the elegant exclusive possession of all Brahmins, having nothing whatever to do with life in its manifold aspects, nor with the making of opinion. For you will indeed find no opinion, nor, for the matter of that can there be one in the absence of taste.

Follow the verger. Yes, and we do, not because we like it but because we must; and hand him our reluctant sixpences. Follow him and ignore our dirty, disorderly, unplanned cities with their needless noise and wasted water-fronts; their crazy taxation and mercurial real-estate values; their dreary, squalid suburbs and inhuman housing; our prisons that perpetuate barbaric hatred and black besotted ignorance of man's duty to man. Follow him to gape at showy libraries pathetically supposed to represent general knowledge and love of literature on the part of a public that scarcely noticed it when the conspicuous giver of most of them stood in honor amid a learned assemblage and complacently wiped Homer off the literary map (a far cry from the dictum of this our omniscient ironmaster, to the plea of those Maitres des Forges, who begged for classical training!); at great museums, splendid and worthy it is true, useful, necessary—I deny them not one whit of their untold value—them I admire, but not the aspect imposed upon them by the verger, who thinks the mausoleum of bygone fertilities an adequate substitute for present productiveness. Follow him and remain blind to our shiftless farms and squandered woodlands; our choked, polluted dried-up ravaged rivers; our schools that teach everything but the desire for learning and the way to use it; that triumph in their labored processes for stamping individuality flat and crushing the noxious weed initiative. And as we go, we listen to his drone about equality, opportunity and democracy, the American spirit, our progress and our superiority.

Such a verger as he of my ecclesiastical encounter is a plodding functionary of little interest; few know and fewer care what may be his name. But a verger whose exhibit is so vast as that of this other; who leads by the nose our swarming millions all day and every day—he is more of an affair. He should have a name, that fellow. And I propose to give him one. I shall call him Our Subfusk Public Taste.

That I attach altogether undue importance to the possession of taste will be the natural belief of those accustomed to regard it as an ornamental adjunct of our existence, a sort of delicate embellishment of refined living. To them, who take their orders from the verger, his good old formula, "correct taste," is as the saying of a prophet. They, in their way, the respectable verger way, established and sanctified, believe it can be taught as so many other things are taught us; stripped of their context; dissociated from their causes and their implications; torn up by their roots; so, with the juice squeezed out of them, imposed upon us as isolated useful facts, irrelevant but necessary, which we are then supposed to know and to remember. As geography is taught and spelling; as grammar, Latin, history for instance—the arts and much of architecture.

This taste of ours, then, is largely a matter of being told what to admire—I will not say like, for that is far too active a verb. We put it on or off like a garment; it is as any other fashion. And it has no closer relation to what we really are as a people, to our actual lives and manners, than have the Pandects of Justinian to a City Magistrate's Court. As we cannot follow here the complicated extent of its many vagaries, let us look at just one of its funny antics. A little while ago, we were very sure that we had found the recipe for our domestic architecture in the Italian Renaissance. The sum of our accomplishment in that style was becoming such as to be an index of our capabilities, when, after a declension into the accumulating of loot, naively accepted by us as the fair equivalent for capacity on our part to originate, we suddenly discovered

Louis Seize and our esthetic salvation. Every one became possessed over-night of the most astonishingly intimate acquaintance with France of the eighteenth century, and displayed it in an appropriate, if somewhat jejune, setting of white panels and period furniture. Perhaps the less I say the better of the appropriateness of that setting to the social quality of the display. The locutions of the Quartier Latin invaded the politest drawing-rooms and even a comforting touch with Montmartre wickedness was experienced by those who fondly imagined they were speaking French when they ordered a demi-tasse from a waiter whose native tongue was probably Greek.

Then, one fine morning, we awoke to find that poor Louis XVI was dead—or worse, *démodé*, and that we must move across the Channel. To talk of "Heavy George" was no longer queer, and you had to know about that and "William and Mary," and to be informed upon Palladian architecture. There we are now, unless something has happened since I last looked out of the window, sure of our classical English, though I seem still to hear a voice wailing for universal Gothic, from somewhere down in the pie-belt.

Of course, I have drawn neither a complete, nor even a fair picture. I am not unaware of the place and the need both for adherence to tradition and the cultivated appreciation, as well as the use, of those things upon which time has set the seal of approval. Nor am I ignorant of the happy fact that throughout this land many are to be found who may be called brilliant examples of culture and attainment; beyond that, indeed, of public-spirited devotion of their advantages to the common good. Far from it! but all that is not what I mean by public taste.

As I conceive it, such taste should be a sort of current flowing through all the veins of our citizenship; an attribute of the man in the street; born in him with his birth; fostered throughout his childhood, his adolescence and his maturity. Not a polite possession or thing applied such as I have tried to indicate just now; not a negative, passive acquirement, but a living force, causing in him acute liking and desire for things orderly, tidy, useful, economical, good and beautiful; hatred for and active revolt against poverty, shiftlessness, wastefulness, disorder, lack of foresight, sham and ugliness. With such a taste generally existent, there would be no mountains we might not move; our preachings and appeals would be to ears trained and receptive; our visions disclosed to eyes clear-sighted from looking square at facts. For *that* taste will be the product of knowledge; knowledge of what is and of what should be, of the relation of things and of their meanings, of the relation of the individual to the community. Not a subfusk thing; not drab and sad in hue, but full of color and life.

I have dared to say it will be, for that is what I believe. I do so believe because the knowledge of which this public taste may be born is to be derived only from education, and I greatly mistake present tendencies if they do not point to new educational paths, paths of self-realization as against mechanical obedience; of the substitution of self discipline for dogmatic drill; of "learning by doing." The road is a long one and it needs so much re-paving that against the dull conservatism clinging to so many deep old hindering ruts, the only effective forces must needs be revolutionary. Our alarm lest, in the inevitable tearing-up, traditional values and beauties will be forever lost is natural, but probably not justified; the road may be rebuilt and the landscape found to remain unchanged; the smoother path a better way for the car of tradition, as well as for that of revolution. Today it is the experiments that are needed, however much in a day to come we shall have to stay the iconoclastic hand. And after all, that hand, once it has had its way, often becomes, by right of what it has done, the conservative hand, and so needs no staying.

We do not yet know that the new trials will altogether succeed. We do know that the old ways have failed, that the drama of modern education is a tragedy. Just what is really promised by Froebel, by Montessori and our variants upon her scheme; what may work out of the Gary plan and its kindred attempts, it is too soon to say. Meanwhile we listen to the chorus of doubting protest and seem to hear the verger's familiar voice, crying aloud the virtues of things-as-they-are and beseeching us to let well enough alone. His apprehensive misery over the prospective upset of his machinery, his bewildered terror lest pupils shall lose the keys of their lockers in the effort to gain their own souls, are like the immortal plaint of our one-time Secretary of War, who on being condoled with because of the hideous mess that ensued upon the outbreak of our war with Spain, said, "O yes; everything in the War Department was running just as smoothly as anyone could wish, when along came this damned war!"

But children wanting to go to their schools and wanting to continue in them—not having to be driven reluctant to their tasks; children eager for those tasks because, instead of stuffy drynesses they are made interesting, real, suggestive, so that one is naturally inquisitive about them; geography not a desperate jumble of queerly-shaped pink and green diagrams, of rivers that flow only away from recollection, but the natural extension of one's own bailiwick, become significant through genuine observation; history made visibly human through the free exercise of dramatic inventiveness; art become a practical means to the fulfilment of common wants; botany no longer the arid accumulation of dessicated instances, remote from the greasy pavements and the congested slums and the dubious push-carts, but actual gardens that the little hands make grow into food for hungry mouths, green for deprived young eyes, quantities and values to be reckoned as the children practise an arithmetic that means something, examples of what may be done with awful sordid back yards, lodestones to draw the ignorant suspicious parents from their tenements to learn of communal thrift and endeavor, civic good-will and unimagined ambitions—these and much more such as these, for which there is not space here, and which all point to the avoidance of the simulation of learning found in repeating the formulæ of learning, and the substitution therefor of personal discovery—are they not at least the possible promise of a future public taste? And if that promise may show even a chance of being made good, what if locker keys are lost, some textbooks made obsolete, systems deranged and the verger generally made uncomfortable? Too soon yet to say how much of promise will be performance, but it is not too soon to say that we have to begin with the children; that we must learn how to liberate the divine creative

impulses inherent in all of them, not to repress those impulses; that we have wasted the days of our children and thwarted their inborn desire for knowledge, stupefied them with indigestible uncoördinated facts; that aversion from learning is a valid, unescapable condemnation of our methods; that although our sentiment for the Little Red School House may be justified by its early days of service, we have passed away from it to a so-called democratic education which has done nearly all that human ingenuity can in a free country to unfit its victims for the responsible conduct of a democracy.

And, if we survey our teaching of the arts, we gaze into chaos; much of what we see is deplorable, most of it needs to be improved. The arts are among the other manifestations of taste; where there is lack of taste there lacks that which must find expression; as we conceive taste to be quite apart from common life, so we have our strange conception of art as something to be put on or off like white gloves for a party, rather than the motive force actuating the hands within the gloves. And so conceiving it, which is to say that we do not know what it is, that is how we teach it, as having naught to do with life. Schools of painting and sculpture, taking young fingers to train in their technique—for it is while the fingers are still flexible that such training must begin—and not only making no provision for but even standing in the way of any training whatever of the minds which alone can inform those fingers. Understand that I am not here concerned with the phenomenon of the occasional genius, who will arise in almost any environment, just as they have arisen in ours. It is the general level I have in mind; the making of an atmosphere; the preparation of a soil, in which those of every grade of talent and capacity may flourish and find their place; so that artistic intelligence may pervade and be everywhere applied. For what sort of national art may we expect to grow out of the stifling of citizenship; what sort of artists can they be who have no national self-consciousness, no true conception of their country?

Some twenty-five thousand years ago, I think it was (but the exact date I cannot vouch for), men scratched upon bone or ivory, and cut into the rock-walls of their cave dwellings the representations of animals whose fossils alone now remain. These are, in many cases, drawn with a spirit so free, a line so sure, a quality of lifelikeness so convincing that for their parallel in historic times we must go, say, to those masters of convention, the Japanese. And yet we feel safe in asserting that there were, in those distant days, no art-schools; in default of records, we can say it on the evidence presented of accurate observation. Those Crômagnons drew, not as men taught that a certain way was the right way to draw a certain thing, but as men who saw and drew what they saw. It looks now as though our schools of art were doing the same thing that we so faithfully accomplish in our other departments of education—mashing their pupils into a given shape so that their own natural shape shall be destroyed.

But, I am told, what I say may contain some truth, though only as to the public education of the masses and the special processes for training in the arts. In our highly wrought establishments for the privately fortunate no such faults may be alleged. To this my reply is an actual illustration. A youth, in the last year at one of the most illustrious private schools, and proposing to go therefrom to a university, is afflicted with artistic proclivities. In his long vacations he has worked at drawing and painting; at school he has tackled, in his very scanty leisure, certain unfamiliar problems of drawing. At that school, as expensive as anything our wonderfully expensive country affords, it is utterly impossible for him to obtain any sort whatever of help, criticism or comprehension in this particular bent. The establishment entertains no sort of doubt that a heavy proportion of what it requires of him is only of indirect application; he will never be a professional athlete, for instance, nor will he be a clergyman. But though drawing can be taught to any intelligent boy or girl, though it is a highly useful accomplishment and excellent training for hand and eye and greatly increases one's accuracy of observation, quite apart from any question of a proposed artistic pursuit, yet its educational value is ignored. This being so we need not be astonished at finding a like ignorance of the practical utility of cultivating that esthetic consciousness which permeates the lives of those historic periods this youth is required to study and expected to understand. When he passes on to his chosen university, he may, if he can find time to do so without too much invading his desired academic progress, dabble in certain "Fine Arts" courses of a supremely desiccated and irrelevant nature and leading straight nowhere. Then, at the age of twenty-two, he will enter upon the special study of his profession as an almost new thing, to be begun without any real preparation, whereas, if he had been sanely educated, that preparation would have been begun soon after he left his cradle, and have been developed naturally throughout all his student days.

Architecture, mother of the arts and all the crafts, compounded of them all, remorseless inevitable record of our civilization—her schools are branches of our great seats of higher learning, of universities still professing to inculcate the study of the humanities. Yet these founts of wisdom and culture, existing by virtue of all that heaped-up store of history telling and telling again in multitudinous tongues how all the arts in all the ages were of the essence of men's lives and interdependent; teaching that history; aiming, we must assume, to drive their teaching home, conduct these schools as though the great art of architecture ran no roots into its allied arts; ignore its dependence upon the crafts—those crafts that fill our museums to overflowing; scarcely seek, through intimate familiar contact with the beautiful, to quicken the sensitiveness of those who must be its students and would be its makers.

Against the darkness there run gleams of light; good, even great, work of individuals such as Professor Mann, for a brilliant example; concerted efforts of groups, notably, let it be said, what Minnesota is doing in her University and through the state; luminous intelligence striving to batter down entrenched indifference; rising unrest and louder protest; voices asking questions that demand an answer, the answer of new ways.

In those new ways seems to lie whatever hope there is of public taste. Edmond Holmes, writing of Discipline and Freedom, says this of them: "Some day or other we shall begin to realize that social reform, for which we are

all waiting, is to be achieved, not so much by legislation as by the transformation of character; and that the transformation of character, which is another name for the evolution of character, must begin in the nursery and the schoolroom. When that day comes, we shall look back with gratitude to the great pioneers who, inspired by faith in the child's latent capacity for good, taught us how best to give freedom to children, young and old—such a measure of freedom, duly arranged for and safeguarded, as would provide for the outgrowth, on the one hand, of independence, self-reliance, and self-control, and, on the other hand, of sympathy and good-fellowship, and would thus make it possible for the child, in all the stages of his development, to discipline, and moralise, and socialise himself."

Social reform, says the Englishman; yes, or civic consciousness, integrated life, communal well-being—call it what you will. It should be the foundation of public taste; taste that spells freedom; that demands the truth; that will not accept phrases as a substitute either for facts or for action; that will reject the poor, the mean, the bad; that will insist on just such work for the ending of cruelty and human waste as Osborne's at Sing Sing prison; that implies a higher citizenship.

With that we may hope to have indeed government of the people, for the people, by the people; to follow, not the verger, but our star*.

C. Grant La Farge.

*An address at the Fiftieth Annual Convention.

The Architect and His Education

NO subject in connection with architecture has been more exhaustively written about than this. The adverb is used with intent; it applies to every phase of the subject from writing of it to reading about it. Its problems have the fascination for writers that perpetual motion has for inventors. Logic tells us that neither are soluble; yet the output of perpetual-motion machines is no greater in number than of the proposed solutions of the problems of architectural education. A continuous victory of hope over experience. We take up the cry of Thalassa! Thalassa! only to find later that salt water has its drawbacks for drinking purposes. We have forgotten the effect of an overindulgence in wild honey. The insoluble element however is the individual—not because he is an individual, but because he is so varied in the mass—and since we must fit our educational system or theories to the average, the extremes suffer in direct proportion to the inflexibility of our system.

One remedy after another is proposed to ease the pain; we are told that all inspiration must be drawn from the past; that the student must be imbued with the spirit of Rome and Greece; that the fundamental underlying principles of composition must be taught in the school, the inspiration to be drawn later from any and every source. Last we learn that it is the present which must be studied.

It is not a new thought which I wish to suggest, or a new element to be mastered by the student, which will turn him out from his college a full-fledged architect, but rather that the various elements of his education be mixed in a different proportion so that when he finishes his course he may be ready to continue to study to the day of his death. If he is the true artist, not till then may his soul rest in peace.

The law has its two terms, tort and remedy; medicine its diagnosis and treatment; in each case the first must be defined before the second is determined. What therefore is the malady of which it is complained that architecture is suffering at the present time? The completion of the voyage of the "Beagle" had an effect upon the philosophy of art only comparable to that of the "Mayflower" upon American furniture. Art, of which architecture is one manifestation, is an expression of human activity, conditioned and determined by environment and heredity. It is, in the case of any people, good or bad in so far as it truly represents that people, their ancestry, environment and social condition. The art of the old empire in Egypt was the expression of a people marvelous in their directness, simplicity and bigness. Nowhere can the keen subtleness of the Greek be better read than on the Acropolis, nor the mysticism of the middle ages than at Chartres. All three are great arts in which the innermost soul of a people has expressed its greatness and its smallness, its everyday life and its religious hopes, its soul's questioning in the Sphinx of the desert and its bodily discomfort in the grotesques of Chartres.

Applying such standards of measurement to architecture in America is but another form of the question, Is there an American style? Does architecture in America represent the American people, their climate, their life and their heredity? On the purely constructional side it does; our buildings are well built, they are modern in construction, they keep out the elements; they are as well suited to the climate as the buildings of any time. But construction is not architecture. The Gothic vault is a constructional development of Gothic architecture—the architecture resultant of the social needs and physical handicaps of the middle ages; the marvelous handling of the Gothic vault is architecture; the steel skeleton is a development of our needs and resources. Our handling and clothing of it is not architecture and it never will be till we learn that the problem is not to clothe and express the steel skeleton but to clothe and express the social and economic needs which have called forth the building with the steel skeleton.

Germany, born as a nation half a century after ours, has a national architecture. In it may be read the character and life of the German people, even to their national motto of "Verboten." We go to Germany for our inspiration in city-planning; we study the work of the German architect and city-planner, not to learn from it an appreciation of beauty but because above all he is a student of social conditions; his ideal is a social ideal; he cares little for beauty, for the "inheritance of the past." Above all he seeks for a solution of the social program, and in seeking he inevitably produces a national architecture.

The American architect, the product of our architectural education, fails to produce an American architecture in just so far as he loses sight of the social side of the problem. The function of the architect of today is more complex than formerly, his problems more difficult to solve, his inheritance larger. Because of this his *raison d'etre* is lost sight of. Let the physical requirements of the problem be resolved and stated in feet and inches and he is replaced by the constructor. Factories are largely built without the aid of the architect. The architect's function is to translate the solution of the social problem into brick and mortar —more than that, he should first seek this ideal social solution. It is this last that he is apt to neglect. His school training did not emphasize it, and it is for the most part unconsciously that he has felt its need in his later practice. He has felt the lack of sufficient subject matter to justify the fine words of his style; the tongues of angels have become to him as sounding brass. The writer has his tale to tell, the painter his message; so, too, the architect, if he be the artist, has his story clothed after the manner of his craft and tested by its every Shibboleth; but that it all may be worth the candle, the story must be first worth the hearing.

If the diagnosis is correct its very statement outlines the cure, suggests the treatment. Our schools have sought to produce men familiar with the historical monuments of the Past and skilled in the art of combining their fragments—architectural cooks whose broth has the fault of any broth where ingredients have been kept overlong. They have not defined for the student nor themselves the aim, the object for the attainments of which the curriculum has been prescribed. Diagnosis and treatment are terms seldom applied to the functions of the architect. The school does not recognize the architectural diagnostician and does not attempt to train such a person. It trains in a most excellent fashion the architectural attending physician; the man who knows his precedents, his styles, his examples, the man of refinement, taste and discernment. But it does not give to him the objective for which all these things are the necessary means of attainment. It does not place definitely before the student the object for which his education is undertaken. It leaves him without a directive force, a focus for his knowledge of planning, his familiarity with the past and his appreciation of the beautiful. It is just this which differentiates the true architect from the archeologist; the creator of an art expressive of the present from the student of the arts expressive of the past. The great architect of the past knew the needs of his time and its handicaps, its thoughts and its hopes, and knowing them preached of its future. A church whose spiritual development had halted proclaimed its future material grandeur in the dome of St. Peter's no less insistently than it did in that of the Pantheon—great works of art preaching of a hoped-for future in the language of their day.

It is not the past we must study nor the present but rather the future. This is but another mode of saying that the student should be taught to analyze his problem from the social rather than the physical side. He should be taught to seek the ideal back of the actual, to study the causes and tendencies beyond the physical stated requirements. He should be taught to write his own program, to seek the ideal requirements of the future building and not be contented to accept them as written in the past. Every program has this ideal element. The museum of art is no longer a series of galleries for the exhibition of works of art, arranged chronologically, each beautifully ticketed in its glass case; it is an institute for public instruction, striving to reach out to all the people. The hospital is not only a place to which sick people go, it is a center for social betterment, for preventive medicine, for investigative research. Its ideal is not to cure people but to do away with disease. So it is with every form of human activity which is to be encased in its architectual shell, whether it be an industrial city built out of hand on the open shore of the Great Lakes or a tenement house in the slums of our oldest city.

For the school such training of the student in the technique of his profession becomes simpler. The history of architecture becomes no longer the study of examples, more or less interesting and more or less beautiful, but an all-absorbing study of social and economic causes with their resultant architectural effects. The student sees in the various periods and styles, their transitions and developments, the working of economic and social forces, and in seeing them is better able to translate these forces of today into an architecture of the present. The storehouse of the past becomes for him no longer a museum of antiquities but a reservoir of vital inspiration. He no longer knowingly attempts to warp the present and future needs of today into a shell to fit the architectural expression of the requirements of a historical past. As with the painter, the technique of the past—a period only separated from the future by an immeasureable present—is of ever new interests; the study of how the result was obtained, how the various architectural elements were combined to fit and give expression to a social need.

This then is what is suggested. That the school training be brought into closer correspondence with the course of later practice and the student be spared the necessity for readjustment of standards and point of view in passing from the theoretic problems of the college to the actual problems of practice. This would be a reason of slight importance in itself if it were not that an analysis of the great examples of architecture show their authors, consciously or intuitively, to have sought after an ideal, a perfect social or spiritual solution of their problems which they then clothed in the architectural raiment of their skill. Let the student first be taught to analyze his problems, seek its social reasons, causes, requirements, and its ideal social solution. About this solution let him define in terms of architecture the physical requirements, subjecting each in turn to the evolutionary standard of fitness. Let him learn to see in the country house the life and habits of the owner, and in its plan and facade their architectural reflection. In each case let these things be defined by him. A thought not expressed is but a half-thought.

The architect, if he be worth the training, is more than a builder, he is a prophet whose voice should be heard in the market place preaching in words of today the vision of tomorrow; but it is for the schools to so train him that his message be the product of a full mind pregnant of the future and not a meaningless dream engendered by the memories of a dead past.

FRANCKE HUNTINGTON BOSWORTH.

Book Reviews

Chinese Art. Volume I (Victoria and Albert Museum Handbooks, No. 102). By Stephen W. Bushell. Reprint of Second Edition, London, October, 1914. Price, one shilling and sixpence.

One of the best-known architects in this country, who was visiting at my home some years ago, stood before a Chinese figure of Buddha which I had then but recently acquired. The architect was a man of exceptional training, with a real understanding of the best of the classics in literature and other forms of art. This Buddha standing on his lotus-leaf pedestal is not a museum piece. As Chinese art it is modern, for it probably dates from 1750. Yet it has that almost other-worldly poise and dignity of form and expression which the best of Chinese sculpture possesses in so marked a degree. The color alone is marvelous to me, for the lacquer is laid over gold to a deep brown tone. For a moment my friend stood silent, then he turned away with the words, "It may be fine but I can't see anything in Chinese Art—no real beauty. It is always merely a curiosity."

This incident comes back to my mind as I read Mr. Bushell's all too summary study of Chinese art. I fear that many of us are unable to appreciate the beautiful independently of the accustomed western European forms and traditions. And yet just such an understanding of the art of other peoples would seem to me to be the mark of a really cultured worker in any art. As a contribution to such an understanding this handbook on Chinese art is of value. It is not at all exhaustive, hardly more than a descriptive catalogue of South Kensington Museum exhibits of historical importance. Yet its more than one hundred illustrations show stone, bronze, jade and ivory worked into novel forms, which are always the outcome of the material in which they were developed and often astonishingly beautiful to an unprejudiced mind. These descriptions are accompanied by an interesting review of the probable waves of influence on Chinese art, many of them dating back to so many centuries before the Christian Era that the art produced by Greek civilization seems but of yesterday.

I can hardly recommend this little book for summer hammock-reading; but to anyone who would study it for even a few hours it would give, as it has to me, a sense of a delightful excursion into a beautiful strange world. I wish that copies might be easily secured through the Journal office.—R. D. K.

Indication in Architectural Design. By D. Varon. The William Comstock Company, New York.

An interesting book to both student and practising architect.

The author says in the Preface:

"Having encountered, as a student of architecture, and in more recent years as a teacher of this art, the many hardships that beset the road of both pupil and instructor, I have made it the main purpose of this work to remove many stumbling-blocks from the student's path, and indirectly help the instructor.

"But even without any obstacle, the road to a thorough understanding of architecture remains an arduous one. The student should feel a real calling for his chosen profession, and not be moved only by the material end of it. The late Prof. Julien Guadet, whenever a youth sought advice about entering the career, would put various questions to him about his academic preparation for the studies of the Ecole des Beaux Arts, and end up by telling his visitor that if financial consideration were his principal motive he might as well get a job at once in the first grocery store and begin to make money right away."

Mr. W. A. Boring, who has written the introduction, rightly appraises the value of the book. He says in part:

"The author of this excellent work aims to assist the student in the art of using knowledge of architecture by broadening his perception, by training his powers of visualization, and by making him see as the artist sees.

"To draw well, one must see well, to design well, one must do both, and seeing with Mr. Varon's vision clears up many problems which baffle the student.

"Since all architects are students, this book will also interest older practitioners by setting forth logically and clearly many things they have discovered after years of experiment and observation.

"Because of Mr. Varon's experience as a designer of buildings and as a teacher in schools of architecture in America, he has been able to contribute this material aid to the cause of education."

The written matter throughout is instructive and inspiring. The sketches are illustrative of the text, but are not wholly convincing and should not be accepted by the student as the last word on indication.—C. S. Z.

Joseph Pennell's Pictures of the Wonder of Work. J. B. Lippincott Co., Philadelphia. 1916. $2 net.

We hardly believe that the discovery of the wonder of work will be assigned to Mr. Pennell, but there is no reason why he should not be credited with having been deeply impressed with the wonder of work as it is carried on in the world of steam and electricity and by engines which seem to dwarf the power of man, until we suddenly remember who brought them into being. Constantin Meunier was undoubtedly one of the greatest interpreters of the wonder of work, but again we feel sure that he would not wish to be considered as the prophet who had inspired the world, even though Mr. Pennell so styles him in his generous and sincere dedication. Work is more or less an ancient custom and its praises have been heard before. But the note is a right one and those who search the horizon for a better understanding of the aim and end of work will welcome Mr. Pennell's enthusiasm. The illustrations are after lithographs made by Mr. Pennell and many of them are very impressive in the majesty of the spectacle which they unfold. In the preface Mr. Pennell explains that painters have seldom been impressed with the wonder of work in the working, but generally only with the finished result.—C. H. W.

News Notes

Australian Parliament Architectural Competition Postponed

We are informed through the British Embassy that the above competition has been indefinitely postponed.

December Chapter Meetings

At the monthly meeting of the Philadelphia Chapter, the delegates reported upon the Convention and the members were then addressed by Monsieur Victor Horta, Director of the Academy of Beaux-Arts at Brussels who is at present lecturing in this country. Monsieur Horta expressed a great interest in the problems of American architecture and praised the public-spirited activities such as were referred to in the report of the delegates. He touched but briefly upon the circumstances which have rendered him temporarily an exile, and yet left a profound impression of the disasters which have overtaken the members of the profession in Europe. The editor of the Journal reported upon the immediate phases of the public-buildings situation in Congress.

At the regular monthly meeting of the New York Chapter, over fifty members and guests were present to hear the report of convention activities and accomplishments, and later to listen to Mr. Charles Butler, a member and former Recorder and Secretary of the Chapter, who has recently returned from a year and a half in France. His description of relief activities, hospital planning, and actual trench conditions was listened to with the deepest sympathy, a contribution of approximately five hundred dollars from those present being the immediate response to an appeal for ponchos for French soldiers made on motion from the floor.

Mr. W. B. Faville, from San Francisco, presented his slides of the San Diego and Panama-Pacific Expositions, with comments on the methods and characteristics of the designers of the different buildings which greatly added to the interest of the pictures.

Through the kindness of Mr. William H. Brett, Librarian of the Cleveland Public Library, the drawings submitted in competition for the new library were exhibited on the walls of the meeting-room and attracted much attention.

Registration

We are informed that the following opinion has been delivered by the Attorney General of the state of NewYork in reference to the new law for the registration of architects now in force in that state:

"Section 77 requires that a person who was not practising architecture prior to April 28, 1915, must procure a certificate from the State Board of Examiners in order to be 'styled or known as an architect.' Persons procuring the certificate are to be known as 'Registered Architect,' using the letters 'R.A.' It is therefore apparent that the status of persons who were known as architects prior to the enactment of the statute is not interfered with and they may continue to be known as architects simply. If they desire the added appellation of 'Registered Architect,' they may apply for certification as will presently be shown. Persons who have not been in practice may not be styled or known even as architects in the future. In order to enter upon practice at all they must qualify as 'Registered Architects.'"

The Executive Committee of the New York Chapter have sent out copies of this opinion with the request that architects note any infringements of the law and lay them before the proper authorities.

State Architects

In the November Journal there was published a brief of the report of the Committee on Professional Practice of the Washington State Chapter in reference to the conditions obtaining in the various states as to the employment of architects by the state. The Committee have asked us to say that subsequent knowledge makes it plain that in Oregon the teaching staff of the School of Architecture in the University of Oregon have only rendered architectural services in connection with buildings which have been erected for the University, for which a commission was paid in addition to the regular salary.

A Correction

The name of W. L. Somerville, architect, of New York, should have appeared in the notice on "Allwood—An Industrial Village," on page 499 of the Journal for December, as associated with Murphy and Dana, architects of New York, in the preparation of plans for houses in Allwood We regret the omission.

Obituary

Herbert Jaques

Elected to Fellowship in the Institute in 1891
Died at Boston, Mass., December 21, 1916

Otto C. Wolf

Elected to the Institute in 1901
Died at Philadelphia, December 19, 1916

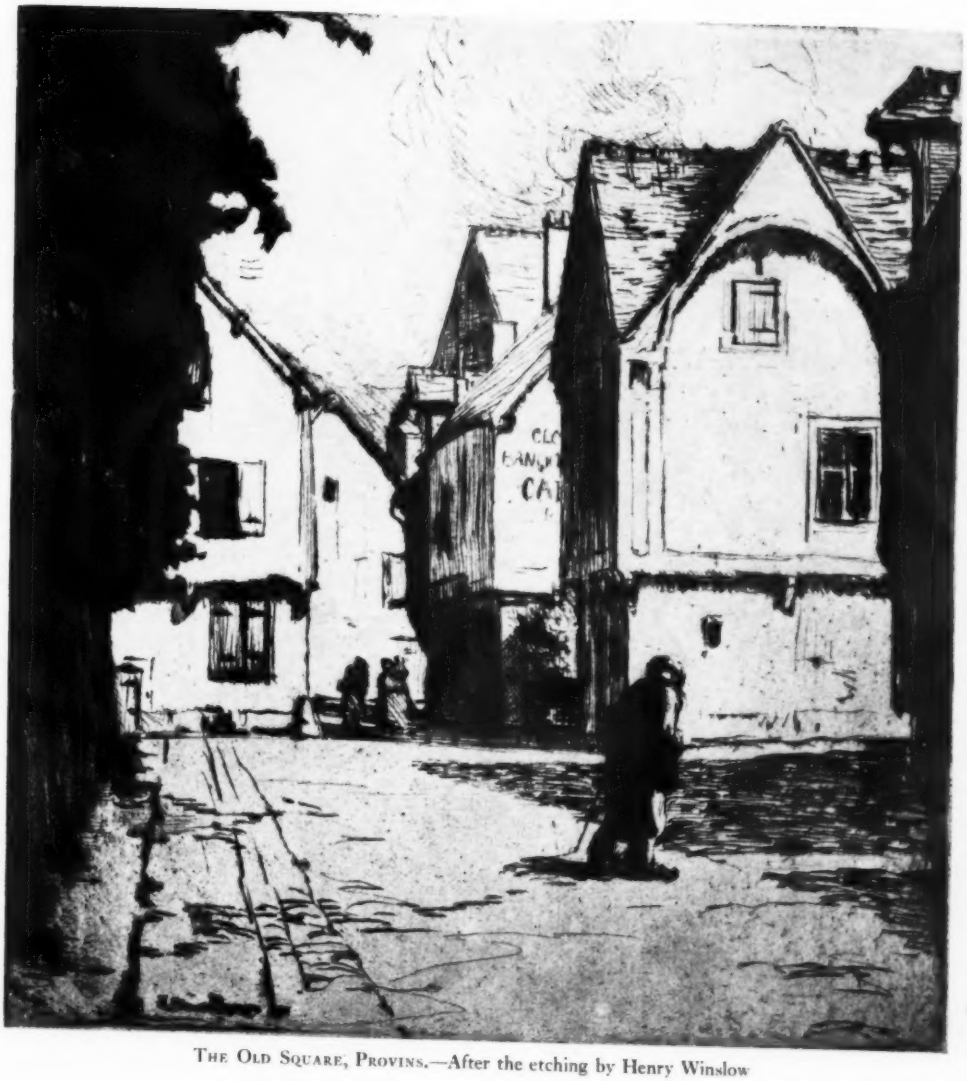
Chas. E. Brush

Member of the Illinois Chapter since 1908
Died at Chicago, November 1, 1916

Mr. Brush was born at Carbondale, Illinois, in 1855, and was graduated from the School of Architecture, University of Illinois, in 1877. His work is best known by the buildings of the Illinois Normal School, at De Kalb, Illinois, and the Lee County Court House, at Dixon, in the same state. At the November meeting of the Chapter, resolutions of regret were adopted in which the Chapter expressed its sorrow and its sympathy for the members of his family.

ST. PAUL'S.—After the etching by Henry Winslow

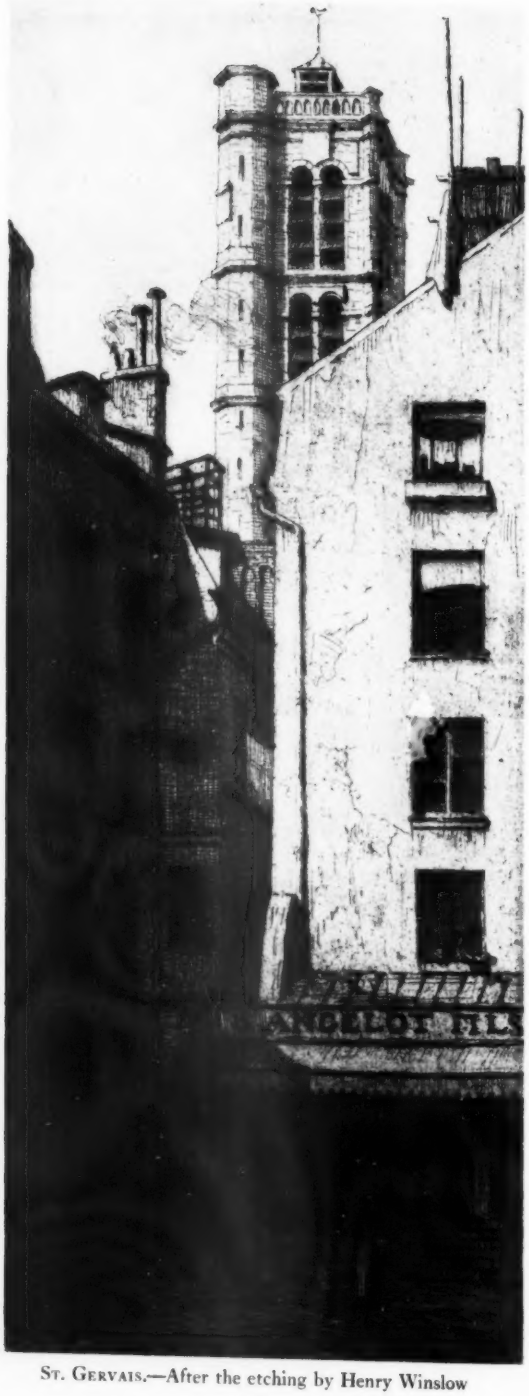
ST. MARY RADCLIFFE.—After the etching by Henry Winslow



THE OLD SQUARE, PROVINS.—After the etching by Henry Winslow

St. Nicolas, Paris.—After the etching by Henry Winslow

RUE CARDINAL, PARIS.—After the etching by Henry Winslow



ST. GERVAIS.—After the etching by Henry Winslow

Beaux-Arts Institute of Design

Official Notification of Awards—Judgments, November 14-28, 1916

Class "A," First Projet

Jury of Award.—F. H. Bosworth, Jr., G. A. Licht, F. C. Hirons, H. W. Corbett, E. V. Meeks, P. A. Cusachs, H. Sedgwick, M. S. Wyath, H. L. Shay, C. Butler, Professor Leonard, J. Wynkoop.

Program.—A Monastic Church. *Drawings submitted, 76.*

Awards.—First Medals, R. W. Blaine and L. Suckert, University of Pennsylvania; L. Fentnor, Atelier Wynkoop, New York City.

Second Medals, K. Fujikura, Cornell University; A. Burton, Columbia University; H. L. Smith, Carnegie Institute of Technology; L. Morgan, E. A. Lehti, W. G. Sprague and H. S. McCrary, Atelier Hirons, New York City; L. C. Licht and A. P. Goodwin, University of Pennsylvania; C. S. Baker and W. B. Dechant, T-Square Club, Philadelphia; A. C. Webb and H. E. Matz, Atelier Wynkoop, New York City.

Class "A," First Esquisse-Esquisse
Class "B," First Esquisse-Esquisse

Jury of Award.—W. Lamb, A. Ware, E. S. Hewitt, J. O. Post, L. Warren, W. L. Bottomley, C. L. Lawrence, W. N. Taylor, W. Emerson, and G. H. Bickley. This Jury also served as Jury of Award for Class "A" and "B" Archæology, First Projets.

Program.—Class "A," A State Capitol.
Class "B," A Stone Ceiling.

Drawings submitted.—Class "A," 15; Class "B," 48.

Awards.—Class "A," Third Medals, L. Morgan, Atelier Hirons, New York City.

Mentions, E. E. Weihe, Atelier Brown, Jr., S.F.A.C., San Francisco; G. L. Kaufman, Columbia University; J. B. Hays, Atelier Hirons, New York City.

Class "B," Mentions, J. Franziello, Atelier Corbett, New York City; M. Boulicault, St. Louis Architectural Club.

Class "A" and "B" Archæology, First Projet

Program.—A Votive Bridge. *Drawings submitted, 4.*

Awards.—Mentions, J. F. DeYoungk and R. Freeburg, Carnegie Institute of Technology.

First Morris Loeb Prize

Jury of Award.—F. H. Bosworth, Jr., J. C. Levi, E. S. Hewitt, P. A. Cusachs, L. S. Weeks, W. Emerson.

Program.—A Frame. *Drawings submitted, 35.*

Awards.—First Prize ($50), F. M. Holcomb, Atelier Rebori, Chicago.

Second Prize ($25), L. Morgan, Atelier Hirons, New York City. Placed third, G. M. D. Lewis, University of Pennsylvania, Philadelphia. Placed fourth, R. J. Robinson, Atelier Corbett, New York City. Placed fifth, R. A. Lockwood, Los Angeles Architectural Club, Los Angeles.

Judgment of November 28, 1916

Class "B," First Analytique

Jury of Award.—F. H. Bosworth, Jr., L. G. White, H. Sedgwick, M. S. Wyath, H. W. Corbett, H. L. Shay, F. R. King, W. F. Hitchens, Mr. Woolsey.

Program.—An End Pavilion. *Drawings submitted, 156.*

Awards.—First Mention Placed, W. P. Stille and J. O. Vegezzi, Atelier Corbett, New York City; M. N. Weinstein, Columbia University.

First Mentions, J. G. Percy, Buffalo Architectural Club; H. D. Smith and K. B. Weber, Carnegie Institute of Technology; P. A. Tischler, C. F. Roesch, Jr., and D. P. Emley, Columbia University; R. E. Golden, Atelier Hirons, New York City; B. J. Schreyer, New York City; H. W. Anderson, Atelier Rebori, Chicago; G. A. Daidy, George Washington University.

Class "B," First Projet

Jury of Award.—W. Lamb, F. C. Hirons, J. Wynkoop, H. Hornbostel, W. N. Taylor, A. Ware, L. Ayres, L. P. Burnham, V. Alexandre.

Program.—A Photographic Club. *Drawings submitted, 143.*

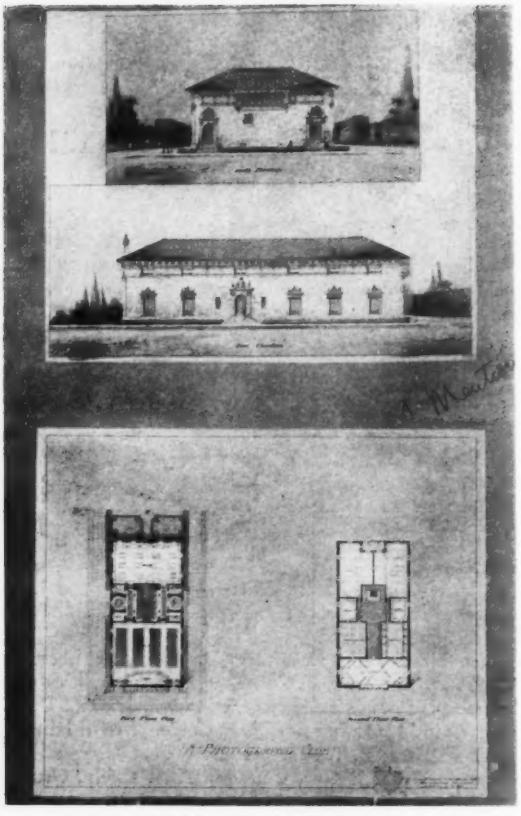
Awards.—First Mentions, E. S. Lacosta, Atelier Corbett, New York City; P. Meng, Atelier Hirons, New York City; A. G. Alexander, Atelier Licht, New York City; L. J. Mahoney, Los Angeles Architectural Club; O. G. Stromquist, Atelier Wynkoop, New York City.

Warren Prize

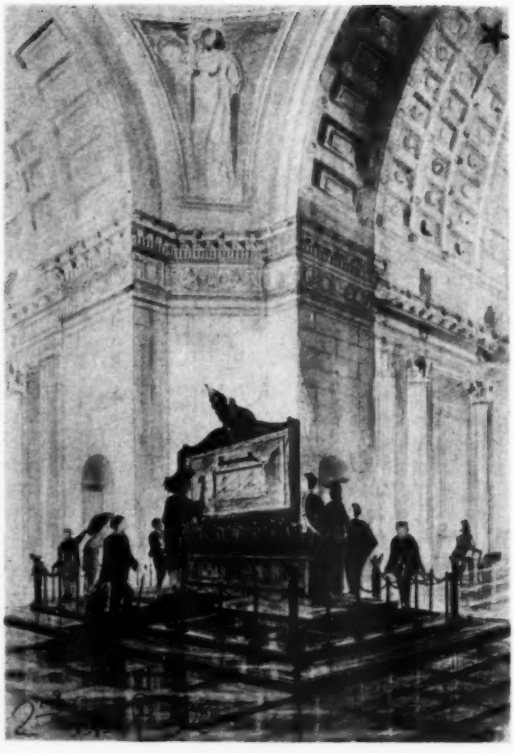
Jury of Award.—F. H. Bosworth, Jr., W. Emerson, J. C. Levi, P. A. Cusachs, M. S. Wyath.

Program.—A County Fair Grounds. *Drawings submitted, 30.*

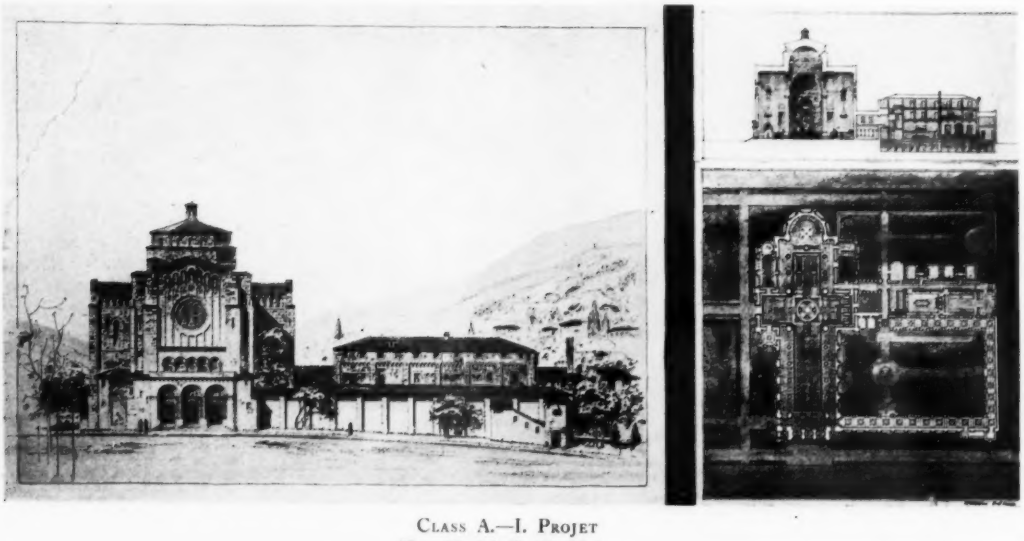
Awards.—First Prize ($50), G. L. Kaufman, Columbia University; Second Prize ($25), I. Seelig, Columbia University. Placed third, A. H. Gentry, Columbia University. Placed fourth, L. V. Lacy, Cornell University.



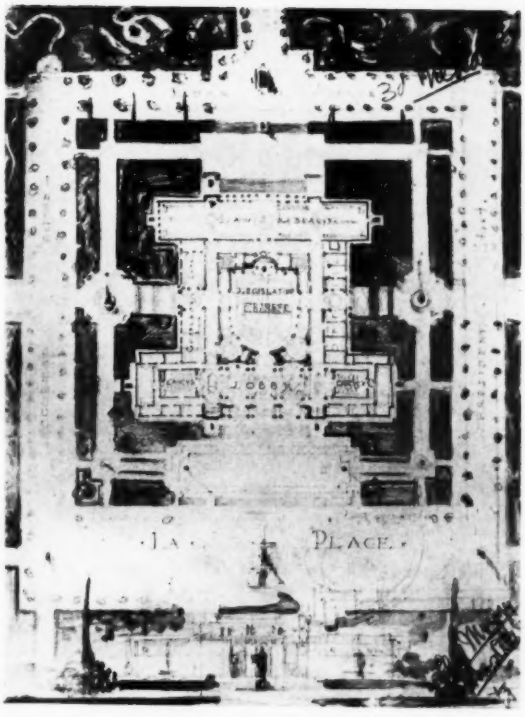
CLASS B.—I. PROJET
First Mention, A. G. Alexander



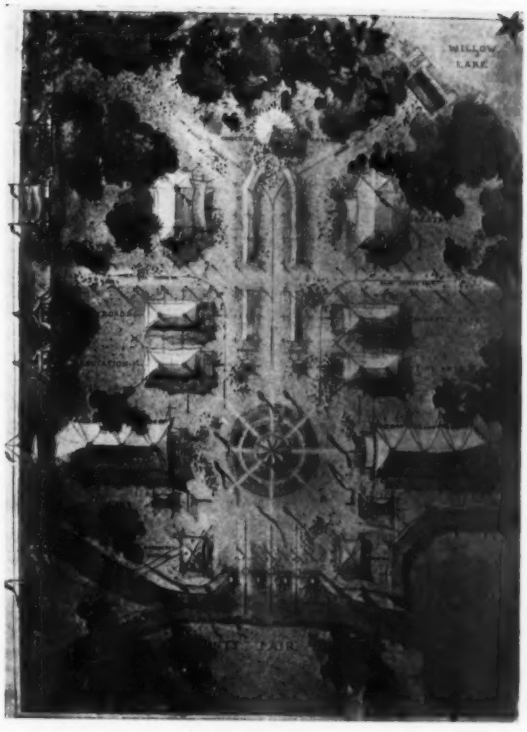
LOEB PRIZE
Second Prize, L. Morgan



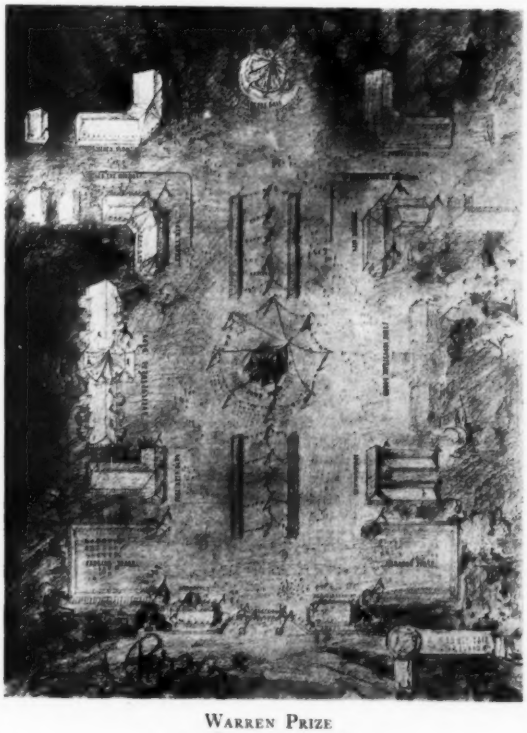
CLASS A.—I. PROJET
First Medal, R. W. Blaine



CLASS A.—I. ESQUISSE-ESQUISSE
Third Medal, L. Morgan

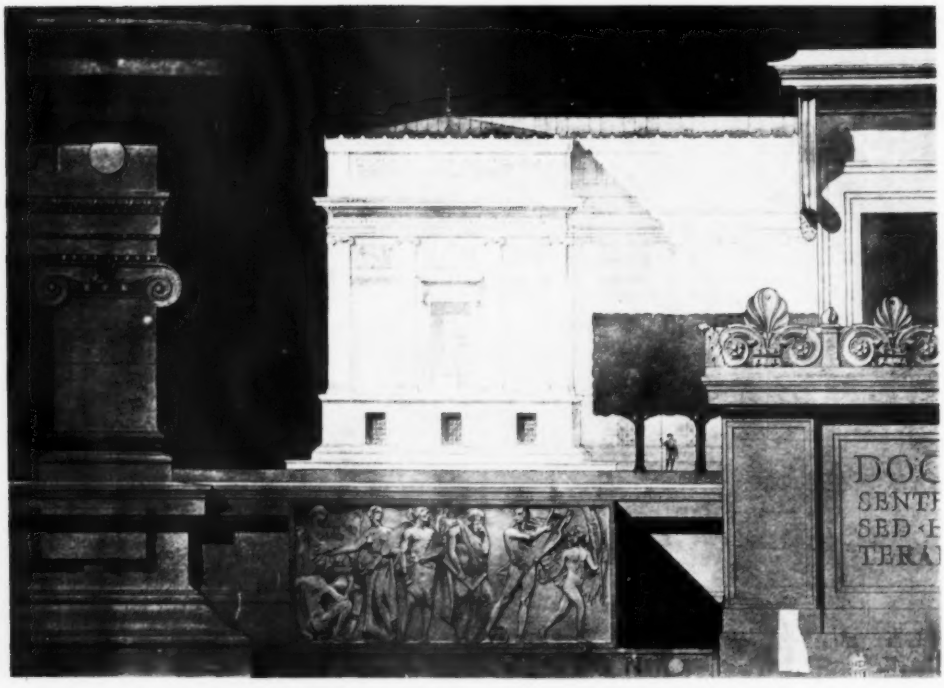


WARREN PRIZE
First Prize, G. L. Kaufman



WARREN PRIZE
Second Prize, I. Seelig

LOEB PRIZE
First Prize, F. M. Holcomb



Beaux-Arts Judgments, continued.—CLASS B.—I. ANALYTIQUE
First Mention Placed, J. O. Vegezzi

Town-Planning and Housing

GEORGE B. FORD, Associate Editor

Indian Hill—A Garden Village Near Worcester, Mass.

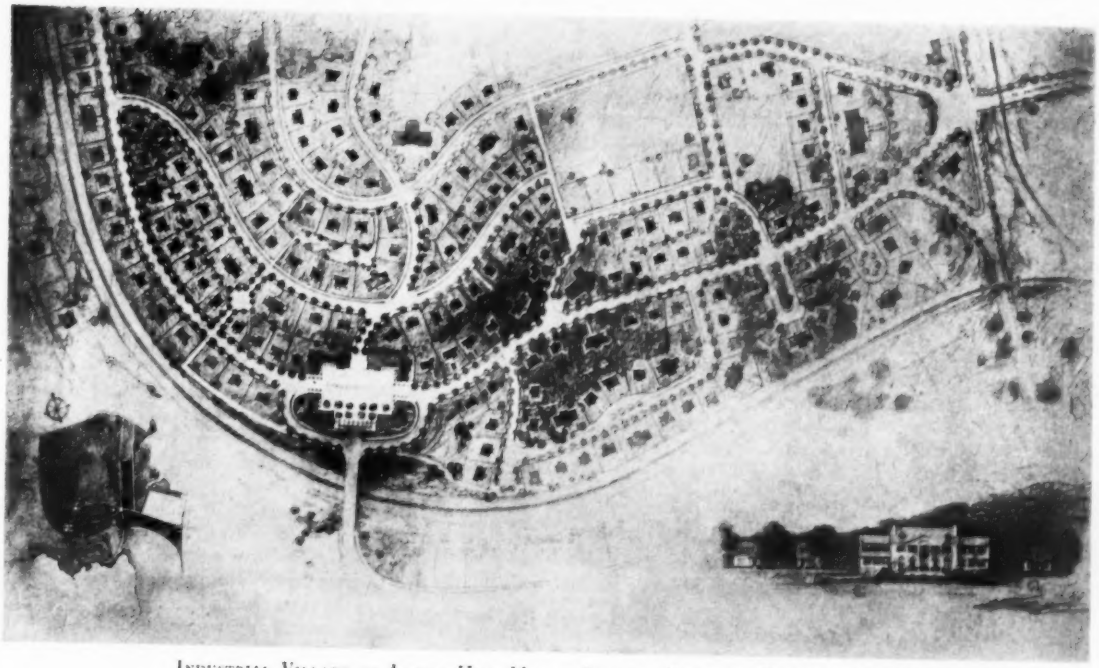
Indian Hill garden village, near Worcester, Massachusetts, is the most recently completed example of an industrial village carried through on comprehensive lines. Situated on a ridge overlooking the head of Indian Lake, several miles from the heart of Worcester, on a site of 116 acres (30 of which have actually been developed), it affords unusual opportunities for wholesome and pleasant living to the families of employees in the Norton Company, of Worcester, which has financed the enterprise.

As the plan of the development shows, the advantages of the hillside location have been skilfully seized in the arrangement of the streets and in the distribution of the various units of the scheme. Main circulation roads have been given the best possible grades, and minor streets have been laid down in a way which affords that sense of intimacy and domesticity properly associated with cottage surroundings. The community center group holds the salient point on the shoulder of the hill, with a charming outlook from the side of the square toward the lake.

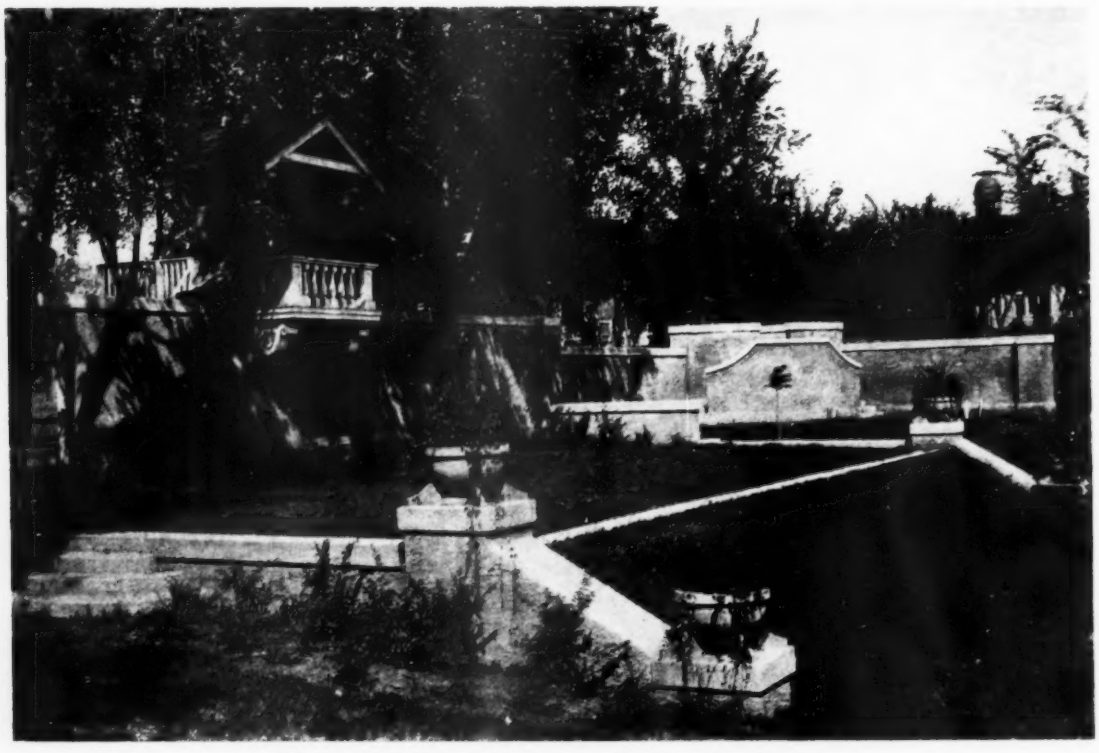
Fifty-eight houses are now completed, all in white, with slate for the roofing material. Site reservations for a dining-hall, Satucket Inn, a boarding-house for bachelors, a similar institution for girls, a chapel and a recreation-hall are already provided. Generous tracts of high wooded land will be set apart for public enjoyment, and parts of the lake-shore will doubtless be developed for sports. A general recreation center on the side hill to the east is planned, and small parks in the center of the various parks may ultimately be developed as children's playgrounds.

The property is carefully restricted, houses are well constructed, and sales are made to employees of the company on the most liberal terms. The cost of a typical six-room house in 1915 was a little over three thousand dollars, or about sixteen cents a cubic foot. The cost of acreage improvement—that is the construction of sewers, sidewalks, roads, and the planting of trees—has amounted to about seven cents a square foot, this figure not including, however, the overhead and administrative costs, which were not available.

The town-planner for the development and the architect for the houses is Mr. Grosvenor Atterbury, of New York.



Industrial Village at Indian Hill, Mass.—General Plan and Types of Houses



GARDEN TERRACE THEATRE, YANKTON COLLEGE, SOUTH DAKOTA

A Garden Terrace Theatre

The garden terrace theatre at Yankton College, South Dakota, was prepared from plans drawn by Phelps Wyman, landscape architect, of Minneapolis, with whom was associated A. R. Van Dyke, architect, of the same city. The theatre is the outgrowth of the annual open-air presentation of a Shakespearean play by student amateurs, funds for the new development having been provided by a group of local citizens. The theatre is to be devoted not to college uses alone, but is to serve the entire community in which the college is located, as a civic center of educational influence.

The dimensions of the terrace stage are 30 by 60 feet, a line of concrete, shaped for footlights, marking the front edge. The sides are outlined by low walls with steps descending to lower garden levels lying to right and left of the stage, which furnish extra space when required. The rear wall at each extreme end is brought forward in a wing to a distance of 30 feet. At each corner thus formed there is a garden balcony, which may be used as a feature of the picturesque setting in the case of a large pageant spectacle. Two large trees rising from the stage form a wide-reaching canopy of foliage. Behind the rear wall is a double line of large trees, forming background to the stage. The audience area, sloping toward the stage, is inclosed by a formal hedge. The whole inclosure is permanently arranged to be lighted electrically.

City Residential Land Development. Studies in Planning. Publications of the City Club of Chicago. The University of Chicago Press. 1916. $3 net, postage extra.

Some four years ago the City Club of Chicago held a competition for the best suggested development of a quarter section lying eight miles from Chicago and on the open prairie. The competition is now a matter of valuable history and the publication of the program, with copious illustrations of the solutions offered by the competitors has now become an accomplishment. The book is of absorbing interest, not alone to architects but to all those who are in any way interested in the possibilities of better living conditions in the future. Twenty-six plans, with descriptive matter are included, and these are supplemented by reviews as follows: Esthetics of the Plans, by W. B. Faville, Albert Kelsey, Irving K. Pond; Sociological Aspects, by Dr. Carol Aronovici; Economic Review, by Robert Anderson Pope, the latter being accompanied by elaborate analytical tables of costs.

Beyond the interest of this book there lies the significance of the city club movement and the reader perceives this publication to be a part of the increasing evidence of the scope of such activities as a fundamental factor in the architectural development of the country. For all of these reasons we may heartily commend this publication. —B.

Structural Service Department

D. Knickerbacker Boyd, *Associate Editor*

In connection with professional societies and organized bodies working toward the improvement of building materials and methods, and the following Committees of the Institute:

CONTRACTS AND SPECIFICATIONS

Frank Miles Day, *Chairman* . . . . Philadelphia
Wm. Stanley Parker, *Vice-Chairman*, Boston
Allen B. Pond . . . . . Chicago
Sullivan W. Jones . . . . . New York
Milton B. Medary, Jr. . . . . Philadelphia
Frederick W. Perkins . . . . . Chicago
Jos. Evans Sperry . . . . . Baltimore

BASIC BUILDING CODE

Chas. W. Killam, *Chairman* . Boston
W. W. Tyrie . . . . . Minneapolis
A. B. Trowbridge . . . . . New York
Owen Brainard . . . . . New York
Robert Stead . . . . . Washington
Frederic C. Biggin . . . . . Oklahoma

FIRE-PREVENTION

Julius Franke, *Chairman* . . New York
W. L. Plack . . . . . Philadelphia
Richard Schmidt . . . . . Chicago
John R. Rockart . . . . . New York
C. H. Alden . . . . . Seattle
Lyman A. Ford . . . . . New York

MATERIALS AND METHODS

Thomas Nolan, *Chairman* . . . . . University of Pennsylvania

(Each Chapter has a corresponding member who is chairman of the Chapter Subcommittee.)

Foreword

HERE begins the annual review of structural activities throughout the United States with particular reference to the standards adopted or under consideration by the various societies, associations or other potential agencies whose work concerns itself in any way with the materials which enter into building construction, the methods and safety of their production, manufacture and erection. Brief reference is made to standardizations by foreign governments and institutions.

Through this work the Editors have the desire to help in perfecting the art and science of building and in advancing the standing of the professions, trades, and crafts which are concerned therewith. This will require the fullest coöperation of all those whose interests are in common with this creed. In thanking those officials of the Government and of the professional, technical and other associations with whom we have thus far come in contact for their assistance which has been so generously given, we bespeak that further coöperation of all others which will be so necessary for the fullest fruition of our plans. In this we include our readers, whose indulgence we ask for any omissions which may be made this year, due to the magnitude of our task, and we invite such suggestions, advice and comments as will help us to do better.

Only a limited number of references in each industry can be given and a part of the service of this Department will be to furnish any inquirers with additional sources of information, titles of other publications, names of authors and publishers, cost of volumes, and to provide any other information possible for which purpose address The Journal of the American Institute of Architects, The Octagon, Washington, D. C.

Note: For any additions, in subsequent numbers, to material appearing in earlier numbers, look always at heading of the Department for serial numbers preceding the current contents, and remember that the main serial number corresponds to the number of the month in the year.

The necessity for providing a historical background requires the publication of such material during the current year only, as a part of the whole idea of the permanent reference and record value of the work.

INDEX—JANUARY, 1917. SERIAL NO. 1

1A1 Foreign Governments, Institutions and Architectural Societies.
1A2–9 U. S. Governmental Departments, Professional, Technical and Other Associations.
1B Testing, Inspection and Research Facilities.
1C Foundational Requirements, Concrete Piling, Steel Piling.
1D Waterproofing and Dampproofing.
1E Cement and Concrete.
1E10 Concrete Fills, and Various Top Coats.
1E11 Treatment of Concrete Floors and Surfaces.
1F Structural Iron and Steel.
1F8 Preservation of Iron and Steel.

Serial numbers and alphabetical designations are for reference purposes only

1A1 Foreign Governments, Institutions and Architectural Societies

1A1a

The importance of maintaining scientific institutions for the investigation and standardization of materials, including those entering into building construction, has been recognized by the leading countries of the world. The most notable organizations of this character are:

In England the Engineering Standards Committee of Great Britain, which publishes the British Standard Sections and the British Standards Specifications, the latter dealing with materials and methods of testing materials. This institution is liberally supported by Royal Grant of the British Government, and by the national engineering societies. Great Britain also maintains the National Physical Laboratory.

The German government maintains the Königliches Material-Prüfungsamt, a large institution devoted to the investigating and testing of structural, engineering and other materials. In connection with the leading technical high-schools of Germany laboratories are maintained for conducting investigations of building and other materials.

In France there is the Laboratoire des Ponts et Chaussees, and the Laboratoire Municipale d'Essais des Materiaux.

These governments also maintain laboratories whose functions include matters pertaining to scientific and technical standards, physical constants, weights and measures and to some extent the properties of materials. Among these are:

In Great Britain the Standards Department of the Board of Trade in charge of the standards and inspection of trade weights and measures.

In France the Laboratoire de Conservatoire National des Arts et Metiers.

Germany maintains the Normal-Eichungs Kommission, and the Physikalisch-Technische Reichsanstalt.

It is generally recognized that these institutions have been important factors in the industrial progress of these countries. These and similar institutions coöperate directly or indirectly with the International Association for Testing Materials, with headquarters at 50 Nordbahnstrasse, Vienna II, Austria. This association, developed from a conference of a small group of workers in experimental engineering held in Munich in 1882; its objects are "the development and unification of standard methods of testing; the examination of technically important properties of materials of construction and other materials of practical value, and also the perfecting of apparatus used for this purpose."

In the United States, as will be noted below, the Bureau of Standards combines the functions of many of these foreign institutions and maintains coöperative relations with other governmental departments and with the various professional, technical, commercial and other organizations.

1A1b

For lists of foreign architectural societies, see Kidder's Pocket Book, 1916. Pp. 1698–1703.

1A2 Bureau of Standards, Department of Commerce, U. S. A.

Authorized by Act of Congress, March 3, 1901; organized July 1, 1901

Director: Samuel W. Stratton, Bureau Laboratories, Washington, D. C.

Publications:

(*a*) Annual Report of the Director. Limited number for free distribution upon request to the Bureau.

(*b*) Scientific papers, (*c*) technologic papers, and (*d*) circulars: Published as investigations warrant; obtainable upon application to the Bureau or the Superintendent of Documents at Washington, at prices quoted or without charge if no price is given.

(*e*) Miscellaneous Publications: Reports of weights and measures, conferences, metric charts, tables and equivalents, obtainable upon application to the Bureau.

(NOTE: For separate lists of these publications of a special interest to those concerned with structural matters, and for extracts from Annual Reports, see notes in connection with each industry.)

Laboratories:

Main Laboratories: Washington, Pierce Mill Road, near Connecticut Avenue.

Branch Laboratory: Pittsburgh, Pa., temporarily located in buildings of the War Department, Arsenal grounds.

The Bureau is authorized to deal with: Standards of measurement, of values of constants, of quality, of mechanical performance, and of practice.

A standard of quality for a given material necessarily takes into account the purpose thereof; too low a standard results in losses, poor efficiency, and even loss of life; too high a one may result precisely in the same thing: that is to say, the material must be suitable for the purpose intended. The Bureau's investigations are to enable the user of materials, first, to select intelligently the material best suited for the purpose; second, to specify it in terms which the producer cannot mistake; and third, to make the necessary tests to ascertain whether the material supplied is in accordance with the specifications.

The Bureau does not compete with private testing laboratories, but endeavors to assist them by the development of standard specifications, methods of measurement, and other matters where uniformity is desirable.

The time is coming when all materials bought or sold must be as represented. This is impossible except where proper standards of quality and methods of measurement have been developed.

Standards of practice are generally involved in the enactment of laws when technical and scientific matters are concerned, in ordinances regulating public utilities, and in the establishment of building and safety codes. Like standards of performance, they are dependent upon standards of measurement and of quality, and are of the most vital importance to the welfare and safety of the public. In a field so broad, the Bureau can touch only upon the more important aspects of the work—where national uniformity is desired—fields which cannot be covered efficiently in private laboratories.

The maintenance by the Government of correct standards of measurement, quality, or performance, calls for continuous scientific and technical investigations of the highest grade, the most competent expert services and the best scientific equipment. Then there still remains the

serious problem of making the results available and useful to the public, a part of which service the Journal will be able to effect through its columns. But the Bureau's activities are not devoted principally to the interests of the user or consumer, for its work most deeply concerns manufacturers, who are fundamentally concerned, directly or indirectly, with the improvement of methods of production or quality of output, for it is upon quality, as well as upon price, that competition must finally depend, whether in domestic or foreign commerce, and the use of such methods and scientific results is the greatest factor in the improvement of quality, efficiency, or the development of new industries.

The work of testing and investigating the properties of structural materials was taken up and is carried on primarily for the needs of the Government in its structural work, but this information is just as necessary to the public in construction work, and every effort is made by the Bureau to make its findings in a form available to the public generally. In this, again, the Journal can really help, especially if its members will avail themselves of the information.

The work of the structural engineering and miscellaneous materials division includes the investigation, testing and preparation of specifications for these materials, such as the metals and their alloys, stone, cement, concrete, lime, the clay products, paints, oils, paper, textiles, rubber and other miscellaneous materials. Questions pertaining to the manufacture, specifications, testing, and use of the metals and their alloys have become so important that a metallurgical division has been formed of the experts engaged in these problems.

The engineering data resulting from investigations which the Bureau is conducting in reference to fireproofing of building columns, and partitions, should serve as the foundation upon which building codes must be constructed. Some progress has been made recently in compiling the municipal building codes, both with a view to furnishing information to state and city building bureaus and to others interested, and to permit a comparative study of existing codes, to assist in planning a systematic program of investigations of the many important questions about which there are still great differences of opinion. This data will be available to the Institute's committee on Basic Building Code, whose coöperation will be welcomed.

Many inquiries are received annually from architects, engineers, contractors, and builders as to methods of waterproofing concrete, methods of construction to be employed in sea water, physical properties of concretes of various mixtures, the cause of staining of plaster walls and ceilings, methods of preventing the dusting of cement floors, suggestions for building code requirements, the physical properties of marbles, specifications for stucco, fire-resisting properties of structural materials, the corrosion of metal lath, and reinforcement of gypsum plasters.

From the general public requests are received for information on methods of mixing concrete, laying of concrete sidewalks, waterproofing basements, suitability of various materials for use in concrete, durability of composition magnesite floors, physical properties of stones, effect of frost action on concrete, suitability of concrete for oil and acid storage tanks, dampproofing brick and tile walls, dusting of concrete floors.

It is hoped that the acquaintances formed with architects, manufacturers, dealers, and consumers, will result in mutual advantage to them and to the Bureau, and that they will feel more inclined to place their problems before the Bureau for solution. Thus the Bureau will be better able to understand their difficulties, and be of the fullest possible service to the people of this country.

—Rewritten from the current Rport to the Secretary of Commerce, by SAMUEL We. STRATTON, Director

1A3 Other Governmental Departments

The U. S. Geological Survey and the Bureau of Mines will be referred to in Serial No. 2. The Forestry Service of the U. S. Department of Agriculture and other governmental departments will be referred to in later serial numbers in connection with the industries with which they are most concerned.

1A4 American Society for Testing Materials

Affiliated with the International Association for Testing Materials.

Secretary-Treasurer: Edgar Marburg, University of Pennsylvania, Philadelphia.

Publications:

Proceedings, published annually, in two parts containing:

(*a*) Reports of technical committees and Tentative Standards, published for one or two years for criticism before final action toward their adoption, (of which there are now 30).

(*b*) Technical papers and discussions.

(*c*) Book of American Society for Testing Materials Standards, about eight hundred pages, published biennially in the even years and containing the standards adopted by the Society in their latest revised form (of which there are now 103).

(*d*) A pamphlet annually, containing list of members, personnel of committees, and general information concerning the Society and the International Association. Circulars of information to members are also issued at irregular intervals averaging about one a month.

(*e*) Standards, also published individually at 25 cents each; to members, 15 cents.

Each member receives the above publications except (*e*), by virtue of his membership. Current issues obtainable by non-members at (*a*) paper $5; cloth $5.50; (*b*) ditto; (*c*) cloth only $7.50; (*d*) $1.

Organized 1898 as American Section of the International Association of Testing Materials. Incorporated 1902 as American Society for Testing Materials, under which designation it maintains affiliated relations with the International Association.

Its purpose is the promotion of knowledge of the materials of engineering, and the standardization of specifications and methods of testing.

Membership may be held by individuals, firms, corporations, technical or scientific societies, companies, teaching faculties, and libraries. For information address the Secretary.

The work of the Society is done largely through its technical committees, which present reports and recommendations at the annual meeting, usually in June. There are now 36 technical committees with a total membership of 992.

On committees dealing with subjects having a commercial bearing, either an equal numeric balance is maintained between the representatives of consuming and producing interests, or the former are allowed to predominate with the acquiescence of the latter.

Standards: (From "Regulations Governing Technical Committees.")

"Proposed new standards or the proposed amendment of existing standards must originate in the particular committee within whose province such standards properly belong. No action affecting standards shall be taken by

any technical committee except at meetings called for that purpose. Action at such meetings shall be subject to majority vote of those voting, and subsequently to majority of those voting on letter ballot of the entire committee. The results of each letter ballot as to the number of the affirmative votes, the number of negative votes, and the number of members not voting, shall be announced in the report of the committee to the Society. Dissenting members shall have the right to present minority reports, individually or jointly, at the annual meeting of the Society at which the majority report is presented.

"Any recommendations affecting standards must be transmitted to the Secretary-Treasurer of the Society at least eight weeks in advance of the date of the annual meeting, and copies of these recommendations, in printed form, must be mailed by the Secretary-Treasurer to every member of the Society not less than four weeks before the annual meeting, so that members may come to the meeting prepared to discuss such recommendations, and that members not intending to be present at the meeting may contribute discussions by letter.

"At this meeting amendments may be made by a two-thirds vote of those voting. The proposed new standards or the proposed amendments of existing standards, as presented or as amended, shall be printed, on a two-thirds vote of those voting, in the Yearbook under a section designated 'Tentative Standards,' on which written discussions addressed to the appropriate committee shall be invited. At the annual meeting in the next even year these proposed new standards or proposed amendments of existing standards shall be subject to amendment by a two-thirds vote of those voting, and to reference by a like vote to letter ballot of the Society. A two-thirds vote of those voting shall be required for adoption.

"The term 'Standards' shall be applied collectively to standard specifications, standard tests, standard methods, and standard definitions."

The various standards affecting materials or methods of building construction will be separately referred to under the especial material or industry affected. A pamphlet giving a complete list of all Standards may be had upon application to the Secretary.

In reference to the Standards of this Society THE COMMITTEE ON MATERIALS AND METHODS OF THE INSTITUTE calls attention to the following excerpt from the recent report of the Executive Committee, American Society for Testing Materials:

"The increasing use of the Standard Specifications of the Society in federal, state and municipal circles, apart from their extensive adoption in ordinary commercial channels, is significant of the confidence placed in the work of the Society and serves to emphasize the reciprocal obligation upon the Society to justify that confidence in connection with everything to which its name is attached. Purchases for the Panama Canal have been made largely under its standards, twenty-seven of the Standard Specifications of the Society being now in use by the purchasing department of the Canal. Again, nine of the Standard Specifications have been adopted—in some cases with slight modifications—in connection with the Boiler Code recently prepared by a committee of the American Society of Mechanical Engineers, which is expected to be adopted in many states by legal enactment."

THE COMMITTEE ON BASIC BUILDING CODE OF THE INSTITUTE calls attention to this excerpt:

"Similarly, in the current revision of the Building Code of the city of New York, seven Standards of the Society are referred to in some such form as the following:

"Except as may be otherwise prescribed by the rules of the Superintendent of Buildings . . . shall conform to the Standard Specifications of the American Society for Testing Materials. . . ."

1A5 The American Society of Civil Engineers (See Serial No. 2, February Journal)

1A6 American Society of Mechanical Engineers (See Serial No. 2, February Journal)

1A7 The American Institute of Mining Engineers

Organized 1871

Secretary: Bradley Stoughton, 29 West 39th Street, New York City.

Publications:

(*a*) Transactions, three volumes annually, contain the proceedings of the Institute which constitute an important record of progress in research and practice in mining and metallurgy.
(*b*) Monthly Bulletin contains professional papers, reports of proceedings, a forum for discussion and other matters of interest.
(*c*) Papers and discussions printed in the Bulletins are also published as individual pamphlets.
(*d*) Year Book containing a list of members and committees.

Members receive (*a*) and (*b*) free; to non-members the prices are (*a*) each volume, paper, $5, in half morocco $6; (*b*) $12 per annum.

Technical committees are actively at work for the advancement and welfare of the profession and to promote discussion and stimulate the preparation of technical papers.

The Institute aims to promote the economic production of the useful minerals and metals, and the welfare of those employed in these industries.

1A8 American Institute of Architects

Organized 1857

Secretary: W. Stanley Parker, The Octagon, Washington, D. C.

Publications:

(*a*) Constitution and By-laws, in which are set forth requirements for membership.
(*b*) Circular of Advice Relative to Principles of Professional Practice and Canons of Ethics.
(*c*) Schedule of Proper Minimum Charges.
(*d*) Circular of Advice on Architectural Competitions.
(*e*) Standard form of Architectural Program.
(*f*) Circular as to Size and Character of Printed Matter Intended for Architects' Files.

All of the above are free on request.

(*g*) Standard Documents, being Contract Forms prepared under careful study and joint agreement with national organizations interested in the building industry. Complete set, in cover, 15 cents, or obtainable from dealers generally.
(*h*) Monograph on the Octagon. An illustrated history of this charming house. $12.50.
(*i*) Journal of the American Institute of Architects. Monthly, $3.50 per annum. Foreign, $5.

(*k*) The Annuary, containing a list of members and committees.
(*l*) The Proceedings, being the transactions of the Annual Convention (*k*) and (*l*), are free to members only. To others, $5 each. For list of Chapters and officers, see Journal (*j*).

Its objects are to organize and unite in fellowship the architects of the United States of America, to combine their efforts so as to promote the esthetic, scientific, and practical efficiency of the profession, and to make the profession of ever-increasing use to Society.

Standing and special committees report through the Board of Directors to each Annual Convention; the reports and action of the Convention are published in the Proceedings (*l*). Actions of the Board at meetings between Conventions and other matters of interest and information are published monthly in the Journal.

Standards: The only standards adopted are those referred to under publications as *e*, *f*, and *g*.

1A9 American Railway Engineering Association

Organized March, 1899, under the laws of state of Illinois (not for profit)

Secretary: E. H. Fritch, 900 S. Michigan Ave., Chicago, Ill.

Publications:
(*a*) Proceedings; annually; contain complete committee reports, full discussion and special articles.
(*b*) Bulletin; ten issues annually; committee reports and monographs.
(*c*) Manual of the A.R.E.A. First Edition, 1905; 2nd, 1907. Supplements, September, 1906, September, 1907. Revised Edition, 1911. Supplements 1912, 1913, 1914. The current (1915) edition contains the action of the 1915 Convention and a comprehensive revision of the action of previous conventions. Included in the contents are:
(*d*) Principles of practice.
(*e*) Suggestions and recommendations.
(*f*) Specifications adopted (Standards).
(*g*) Standard form of contract and bond.

Members receive all of the above. Others may purchase them from the Secretary or book-dealers at: (*a*) paper $6, cloth $6.50, half morocco $7; (*b*) per annum $8; (*c*) paper $4, cloth $4.50, half morocco $5.

The object of the Association is the advancement of knowledge pertaining to the scientific and economic location, construction, operation and maintenance of railways. What an important relation much of this has to the art and science of building construction will become evident from the references to the work of this Association under the various industries, as treated.

Adopted Specifications:

The Manual (*c*) includes only such conclusions relating to definitions, specifications and principles of practice as have been made the subject of a special study by a Standing or Special Committee and embodied in a Committee Report, published not less than thirty days prior to the annual convention, and submitted by the Committee to the annual convention, and which, after due consideration and discussion, shall have been voted on and formally adopted by the Association. Subjects which, in the opinion of the Board of Direction, should be reviewed by the American Railway Association, may be referred to that Association before being published in the Manual.

Matters adopted by the Association and subsequently published in the Manual shall be considered in the direction of good practice, but shall not be binding on the members.

1A10 Western Society of Engineers (Reference later)

1B Testing, Inspection and Research Facilities

Throughout the literature of materials and products, and of appliances and systems pertaining to buildings, there constantly recur the names of departments, bureaus, testing stations, laboratories, and universities, with tables, tests and analyses and references to labels, approvals, and lists of inspected materials.

This is indicative of a widespread interest and service involving activities which need to be better understood by the building public in order that their significance shall be more fully appreciated. It is also vitally necessary that a full understanding of the functioning of these activities and of the methods employed in the testing and inspection of materials prevail among architects, builders and all contractors.

Recognition of tests for the purposes of use intended and of those made by engineers or organizations whose findings are known to be generally acceptable to all concerned is a desideratum. The importance to be attached to testing and checking up for continuity of quality and performance is obvious.

To quote from the National Electric Safety Code (1A2*e*):

"In order to avoid the necessity for a repetition of such examinations by different examiners, frequently with inadequate facilities for such work, and to avoid the confusion which would result from conflicting reports as to the suitability of devices examined for a given purpose, it is necessary that such examinations should be made under standard conditions, and the record made generally available through promulgation of organizations properly equipped and qualified for experimental testing, inspections of the run of goods at factories and service value determinations through field inspections, and whose findings are subject to appeal to departments of the Federal Government having equipment for such review."

Some governmental facilities and others of national scope and semi-public nature are:

1B1a Bureau of Standards, Department of Commerce, U. S. A.

Functions of the Bureau pertaining to building construction in general have been previously described.

In reference to testing, the following is taken from Circular No. 45, "The Testing of Materials," which contains full information and a schedule of the fees charged and may be had upon application to the Director of the Bureau:

"Tests of materials are made for the public where the Bureau is asked to act as referee or where an authoritative test is demanded by the nature of the case, or in other cases where the Bureau is primarily interested in the test in connection with investigation. The right is reserved to make such use of the results of these tests as is deemed desirable. The Bureau will coöperate with investigators, manufacturers, testing laboratories, and others, not only in executing tests, but also on request, in furnishing any information at its disposal concerning materials or methods of testing."

1B1b Watertown Arsenal, War Department, U. S. A.

Watertown, Mass.

Publications:

The results of all public tests are published in the annual report of the laboratory, entitled (*a*) "Tests of Metals," the first volume of which is dated 1881. When available, these volumes may be purchased at cost by applying to the "Superintendent of Documents, Government Printing Office, Washington, D. C."

This laboratory is officially designated as the "Testing Laboratory, Watertown Arsenal, Watertown, Mass."

The laboratory is equipped with two horizontal emery testing-machines, one of 800,000 pounds and the other 100,000 pounds capacity, both adapted for tensile or compressive tests, and with all necessary accessory apparatus, such as measuring instruments, extensometers, machines for determining hardness, testing cement briquettes, and similar work.

All classes of constructive materials are tested, such as iron and steel, in the form of test specimens or full-sized members, cement in briquettes or concrete columns and cubes, brick, or stone.

Under the law any citizen of the United States may have tests made by defraying the cost.

Immediately upon receipt of application for test an estimate of the cost of the work will be furnished, and a sum equal to this estimate must be deposited before work for private parties can be begun.

An official report will be furnished covering each test. All data for private tests is considered confidential, and information concerning same will be furnished only to the party for whom the work is done or his order.

A list of all such tests, giving the name and address of the party for whom made, date of test, and kind of material is published in the annual report of the testing laboratory, entitled "Tests of Metals."

1B1c Office of Public Roads and Rural Engineering, Department of Agriculture, U. S. A.

Director: Logan Waller Page, Washington, D. C.

A laboratory is maintained wherein it has been the policy of this office to test, free of charge, for any citizen of the United States, samples of rock, gravel, sand, clay, etc., provided they are submitted strictly in accordance with printed instructions which are furnished upon request. Such tests relate to the value of material for use in road-work and a report as to such value only is furnished.

1B2a Underwriters' Laboratories

Chartered by the state of Illinois, 1901.

President: William H. Merrill, 207 E. Ohio Street, Chicago.

(NOTE: For list of publications and further description of facilities and service see Industrial Section, page ix.)

This institution began its work some twenty years ago as an electrical testing station. Expansion has continued until now the Laboratories undertake to keep its service available wherever it may be effectively employed in the testing and inspection of materials and products having a bearing on the fire hazard or upon accident prevention.

Equipment for this work includes a large plant at Chicago, a branch testing station in New York City and branch offices for the operation of inspections at factories and labeling of standard products in more than a hundred cities and towns in the United States and Canada, and in London, England.

Upon the conclusion of examinations and tests the results thereof, are bulletined to the various insurance organizations and companies subscribing to or coöperating with the Laboratories' work and a copy of the bulletin and the detailed report is furnished the applicant.

Its chief financial support has been received from the National Board of Fire Underwriters, under whose general direction the work is carried on.

For the work of the Laboratories, with reference to steel and concrete structural members, and fire protection see current activities under these respective headings.

1B2b Associated Factory Mutuals' Laborato

(Reference later)

1B3a Educational Research Work

In addition to facilities offered through Governmental agencies and semi-public institutions such as the foregoing, important work is being done in many educational institutions of the country which maintain laboratories, conduct experiments and make tests of building materials. These, while primarily in connection with the work of the students, add annually to the understanding of materials used in building construction, their qualities, action, protection and proper use.

In many cases this work assumes proportions that are of value not only to the students and local communities but to a national development. Many of these institutions distribute bulletins, circulars, and reports contributing toward this end. Among these may be mentioned the following: (Many of these conduct this work only in connection with their instructional activities. Others will make tests on materials which involve investigation and research elements as distinguished from tests of a purely routine or commercial nature. In those from which we have heard, thirty-four in all, where, either through one of the departments or by arrangement with members of the instructive staff, experiments or tests will be conducted for those desiring them, the institution is indicated thus *. In those marked † are located branches of the American Society of Mechanical Engineers where regular meetings are held.)

†	1. Agricultural and Mechanical College of Texas	College Station, Texas
†	2. Arkansas, University of*	Fayetteville, Ark.
†	3. Armour Institute of Technology*	Chicago, Ill.
†	4. Bucknell College	Lewisburg, Pa.
†	5. California, University of	Berkeley, Cal.
†	6. Carnegie Institute of Technology	Pittsburgh, Pa.
†	7. Case School of Applied Science	Cleveland, Ohio
†	8. Cincinnati, University of	Cincinnati, Ohio
†	9. Colo. State Agricultural College	Fort Collins, Colo.
†	10. Colorado, University of*	Boulder, Colo.
†	11. Columbia University	New York, N. Y.
†	12. Cornell University*	Ithaca, N. Y.

13. Dartmouth College . . . . . Hanover, N. H.
†14. Georgia School of Technology . . Atlanta, Ga.
†15. Illinois, University of . . . . . Urbana, Ill.
†16. Iowa, State University of . . . . Iowa City, Iowa.
†17. Kansas State Agricultural College . Manhattan, Kan.
†18. Kansas, University of . . . . . Lawrence, Kan.
†19. Kentucky, State University of . . Lexington, Ky.
20. Lafayette College . . . . . Easton, Pa.
†21. Lehigh University . . . . . South Bethlehem, Pa.
†22. Leland Stanford, Jr., University . . Stanford University, Cal.
†23. Lewis Institute . . . . . Chicago, Ill.
†24. Louisiana State University* . . . Baton Rouge, La.
†25. Maine, University of* . . . . . Orono, Maine
†26. Massachusetts Institute of Technology* . . . . . Boston, Mass.
†27. Michigan, University of . . . . . Ann Arbor, Mich.
†28. Minnesota, University of* . . . . Minneapolis, Minn.
†29. Missouri, University of . . . . . Columbia, Mo.
†30. Nebraska, University of . . . . . Lincoln, Neb.
†31. New York University* . . . . . New York, N. Y.
†32. Ohio State University* . . . . . Columbus, Ohio
33. Princeton College* . . . . . Princeton, N. J.
†34. Pennsylvania State College . . . State College, Pa.
35. Pennsylvania, University of . . . Philadelphia, Pa.
†36. Polytechnic Institute of Brooklyn . Brookyln, N. Y.
†37. Purdue University* . . . . . Lafayette, Ind.
†38. Rensselaer Polytechnic Institute . Troy, N. Y.
†39. Rose Polytechnic Institute . . . Terre Haute, Ind.
†40. Stevens Institute of Technology* . Hoboken, N. J.
†41. Syracuse University* . . . . . Syracuse, N. Y.
42. Texas, University of* . . . . . Austin, Tex.
†43. Throop College of Technology* . . Pasadena, Cal.
44. Tulane University . . . . . New Orleans, La.
†45. Virginia Polytechnic Institute . . Blacksburg, Va.
†46. Washington State University . . Seattle, Wash.
†47. Washington University* . . . . St. Louis, Mo.
†48. Wisconsin, University of* . . . . Madison, Wis.
†49. Worcester Polytechnic Institute* . Worcester, Mass.
†50. Yale University . . . . . New Haven, Conn.
51. Oklahoma A. & M. College* . . Stillwater, Okla.

1B4 Testing Laboratories and Inspection Bureaus

For the practical business assistance of architects, engineers, and others in conducting tests and analyses of earth-pressure, sand, cement, and building materials generally, and in inspecting the manufacture and erection of steel and other structural members, there exists a number of testing laboratories and engineering concerns of national scope. These are conducted as private business enterprises and many include in their management or on their staff prominent members of several of the societies previously mentioned.

For other information and publications, see Industrial Section, pages viii, ix.

In the case of each industry, after describing the governmental departments and professional, technical, commercial and other associations interested, the order of presentation to be followed, as nearly as possible, will be,

Introductory Remarks.
Information Obtainable.
Other References.
Practice Recommended.
Standards Adopted, or
Progress Reported.
Current Activities.

1C Foundational Requirements, Concrete Piling and Steel Piling

(Other footings and foundations: Stone, Serial No. 2; Brick, Serial No. 3; Wood Piling, Serial No. 4.)

Problems connected with soil conditions are encountered throughout the country. Pending actual investigation of the site, an acquaintance with the source of data concerning conditions likely to be found, the requirements of various cities as to floor loads and bearings allowed, methods of overcoming obstacles similar in nature, the character of engineering or constructional assistance to be obtained, and other information tending to simplify investigation and facilitate subsequent treatment, should prove helpful.

1C1 Information Obtainable

(*a*) The Pennsylvania State College Engineering Experiment Station (1B34, 34). Bulletin, June, 1913. "Experiments on the Distribution of Vertical Pressure in Earth," by R. B. Fehr and C. R. Thomas.
(*b*) A.S.C.E. (1A5), Transactions, Vol. LIII, p. 272. "Lateral Earth-Pressures and Related Phenomena," E. P. Goodrich.
(*c*) Ditto, Vol. LXX, p. 352, "Pressure, Resistance and Stability of Earth," J. C. Meems.
(*d*) Ditto, Vol. LXXI, p. 350, "Earth and Retaining Walls," G. H. Darwin.
(*e*) "Allowable Pressure on Deep Foundations," E. L. Corthell.
(*f*) "A Practical Treatise on Sub-Aqueous Foundations," C. E. Fower.
(*g*) "Foundations of Bridges and Buildings," Jacoby and Davis.
(*h*) "Masonry Construction," Ira O. Baker.
(*j*) "Foundations," M. A. Howe.
(*k*) "Masonry," M. A. Howe.
(*l*) The U. S. Geological Survey has published about four hundred reports (2A1*h*) on various phases of water-supply and conditions likely to be met with in excavating and similar work. Request should be made for information concerning a specific section of the country.
(*m*) In "Journal of the Western Society of Engineers" (1A10) for June, 1914, will be found "Topography of the Red Rock under Chicago," by Roderick Peattie, including diagrams and followed by discussions participated in by several architects.

1C2 Other References

(*a*) "Kidder's Pocket Book," pp. 129–229, 978–982, 1450.
(*b*) "American C. E. Pocket Book," Mansfield Merriman.
(*c*) "Handbook of Cost Data for Contractors and Engineers," H. B. Gillette.
(*d*) "Building Superintendence and Construction," F. E. Kidder.
(*e*) "Carnegie Pocket Companion, 1916," pp. 104, 188, 258–262, 348–351.
(*f*) "Jones & Laughlin Manual, 1916," pp. 82–89, 218–222, 243 284–290.
(*g*) "Concrete Pile Standards," Hunley Abbott, Associate Member A.S. of C.E.

For other information and publications see Industrial Section, p. xvii.

1C3 Practice Recommended

(*a*) By the National Board of Fire Underwriters (Serial No. 3), "Building Code Recommended by the N. B. of F. U.," 1915.
"Excavations, Foundations and Footings," pp. 25–32.
"Bearing Capacity of Soils," p. 28.
"Concrete Piles," pp. 32–34.

(*b*) By, ditto, "Dwelling Houses, A Code of Suggestions for Construction and Fire Protection," 1916.
"Wooden Piling Standards" (adopted specifications), A.R.E.A. (1A9*f*), will be referred to in Serial No. 4.

1C4 Current Activities

(*a*) Special Committee American Society of Civic Engineers (1A5). To codify present practice on the bearing value of soils for foundations. Robert A. Cummings, Chairman.

(*b*) An investigation of the resisting power of earths is being conducted by the Bureau of Standards, U. S. A., in coöperation with a committee of the American Society of Civil Engineers, and a large number of tests have already been made to determine the best means of testing earths under standard conditions. A study of the data thus far obtained has shown the need of some modification of apparatus, and this has been effected with good results. The general laws of earths subject to stress and strain have already been definitely formulated in mathematical physics, but to obtain determinate solutions of the equations for application to engineering practice, it is necessary to know the elastic coefficients of actual earths. In the experimentation being conducted, the endeavor is made to supply these coefficients and their range of possible variation to a closer degree of precision than has been obtained heretofore. A number of experiments have also been carried out with good results to determine the laws of variation of frictional coefficients in relation to diameter and perimeter of piles and foundations as preliminary to further tests on a larger scale. (Report 1916, Bureau of Standards, 1A2*a*.)

1D Waterproofing and Dampproofing

This subject, aside from its relation to engineering problems, is important in the construction of buildings, both above ground and underground. Investigation and experimentation is taking place in Governmental departments, educational institutions and in various laboratories including those maintained by some of the largest manufacturing interests in the country. Practical working tests are being conducted by professional and technical associations, and out of all these activities there will evolve a clearer understanding of when, where and how results may be accomplished in the retention or exclusion of water or other liquids and in lessening the absorptive qualities of those materials enclosing or forming a part of structures.

Under this heading reference will also be made to those forms of construction which are intended to retain or repel water or control it against damage to contents of buildings or other objects.

1D1 Information Obtainable

(*a*) American Society of Civil Engineers (1A5); "Proceedings" from 1872 to 1906; 24 references given in 1D1*r*.

(*b*) Ohio State University (1B3*a*32); 1901 and 1903; "Tests to Determine Causes and Remedies for the Permeability of Cement Mortar."

(*c*) Dartmouth College, Hanover, N. H. (1B3*a*13); Bulletin Thayer School of Civil Engineering; 1902; "The Permeability of Concrete under High Water Pressures," J. B. McIntire and A. L. Pure.

(*d*) National Association of Cement Users and American Concrete Institute (1E1); "Proceedings" from 1905 to 1912; 14 references given in 1D1*r*.

(*e*) Iowa State College Engineering Experiment Station (1B3*a*16), Vol. IV, Bulletin No. 3, 1908; "Experiments on Impermeability and Waterproofing of Cement Blocks, Etc.," B. R. Smith and H. L. Christian, F. E. Cave and G. H. Mack, and W. A. Burton.

(*f*) A.S.T.M. (1A4), Vol. VIII, p. 500, 1908; "Permeability Tests of Concrete with the Addition of Hydrated Lime," Sanford E. Thompson.

(*g*) American Railway Bridge and Building Association, Vol. XVIII, p. 46, 1908; "Report of Committee on Waterproofing of Concrete-covered Steel Floors of Bridges."

(*h*) University of Illinois (1B3*a*15); The Technography, No. 23; 1908, 1909; "Making Concrete Waterproof Tests of Alumand Soap Waterproofing under the Direction of Ira O. Baker," B. L. Bowling and C. G. Derick.

(*i*) Iowa State College Engineering Experiment Station (1B3*a*16), Vol. IV, Bulletin No. 4, 1909; "Experiments on Permeability and Waterproofing Concrete, Etc.," R. R. Strothers and Platt Wilson, O. L. Huffman and E. S. Fowler, Royce Heath, and others.

(*j*) University of Wisconsin (1B3*a*48), Vol. VI, Bulletin No. 1, 1909; "Tests on the Permeability of Concrete," Francis Michael McCullough.

(*k*) A.S.T.M. (1A4), 1909, 1911, 1913; "Reports of the Committee on Waterproofing Materials."

(*l*) A.S.T.M. (1A4), Vol. X, p. 351, 1910; "The Effect of Sodium Silicate Mixed with or Applied to Concrete," Albert Moyer.

(*m*) American Railway Engineering Association (1A9*a*), 1910, 1911, 1912, 1914; "Reports of Committee on Masonry."

(*n*) U. S. Bureau of Standards (1A2*c*); Technologic Paper No. 3, 1912; "Tests of the Absorptive and Permeable Properties of Portland Cement Mortars and Concretes, Together with Tests of Dampproofing and Waterproofing Compounds and Materials," Rudolph J. Wig and P. H. Bates.

(*o*) A.S.T.M. (1A4), Vol. XIII, 955, 1913; "Coal Tar and Asphalt Products for Waterproofing," Samuel T. Wagner.

(*p*) U. S. Department of Agriculture (1B1*c*), Bulletin No. 230, 1915; "Oil-Mixed Portland Cement Concrete," Logan Waller Page.

(*q*) U. S. Reclamation Record ( ), Vol. VI, No. 4, 1915; "Waterproofing Concrete Surfaces," J. L. Lytel.

(*r*) International Engineering Conference; paper presented at San Francisco, Cal., 1915; "Waterproof Concrete," Richard L. Humphrey, Philadelphia, Pa. (Same contains a complete bibliography of waterproofing and concreting to which the Editor is indebted for the references herein given as of especial interest to building constructors.)

1D2 Other References

(*a*) "Kidder's Pocket Book," pp. 1629–1637.
(*b*) "Modern Methods of Waterproofing," Myron H. Lewis.
(*c*) "Asphalt," Clifford Richardson.
(*d*) "The Waterproofing of Fabrics," S. Mierzinski.
(*e*) "Dampness in Buildings," A. W. Keim.
(*f*) "Building Superintendence and Construction," Frank E. Kidder.
(*g*) "Merriman's Pocket Book."
For other information and publications, see Industrial Section, xx.

1D4 Practice Recommended

(*a*) By, Inspection Dept. Asso. Factory Mutual F. I. Co.'s (Serial No. 3), Feb., 1915; "Watertight Floors of Mill Construction."
(*b*) By, N.B. of F.U. (Serial No. 3) "Building Code Recommended by the N.B. of F.U.," 1915, "Waterproofing of Floors," pp. 126, 128, 129.
(*c*) By A.R.E.A. (1A9*e*), 1915, Committee on Masonry, "Waterproofing of Masonry."
(*d*) See, also, 1D1*g*.

1D5 Progress Reported

"Committee D8 of the A.S.T.M., since its organization in 1905, has, through laboratory tests and experiments, together with examinations of work during construction and after completion, as well as the study of literature on the subject, sought to secure sufficient information to enable it to formulate definite methods for securing waterproof concrete structures. The work of the Committee was complicated by reason of the fact that there seemed to be so little concordance between results of tests obtained under laboratory conditions and in the field and that it was necessary to extend its investigations over a period of years in order to determine the permanency of the action noted. The Committee reported that while it had not been able to arrive at sufficiently definite conclusions to enable it to formulate specifications for the making of concrete structures waterproof or for materials to be used in such work, it had reached certain general conclusions which might be of assistance to the constructor in securing the desired result of impermeable concrete."—From "Kidder's Handbook," 1916, p. 1630.

1D6 Current Activities

Investigation of Integral Waterproofing Compounds.

(*a*) During the year a coöperating committee was organized, composed of representatives from Government offices, engineering societies, and the various industries, including all known manufacturers of waterproofing compounds. This committee coöperated in planning a series of field experiments, which contemplates the construction of concrete tanks by contract, both with and without waterproofing compounds. These tanks are to be located below grade near the Potomac River and subject to tidal water. A questionnaire was also prepared and submitted to architects, contractors, and engineers, to gather information on the present usage of these materials. Results of this investigation should be available during the ensuing year. (1916 Report, Bureau of Standards, 1A2*a*.)

Bituminous Materials.

(*b*) Definite methods of tests and specifications have been developed for coal-tar, waterproofing, and roofing pitches, to replace the loose and indefinite requirements which have been more or less in use in the Government service. Methods and specifications are being developed for asphaltic materials. Information is being obtained to insure satisfactory felts and papers for saturation with asphalt and tar products for waterproofing and roofing purposes. Modification of specifications for these latter materials may become necessary, since shortage of rag stock has increased the use of wood-pulp, jute, and manila fiber. (1916 Report, Bureau of Standards, 1A2*a*.)

(*c*) The use of lime will be referred to in Serial No. 2, (February.)

1E Cement and Concrete

The manufacture of American Portland cement first secured recognition at the Centennial Exposition in Philadelphia, in 1876, when David S. Saylor exhibited Portland cement made at Coplay, Pa. The first recorded statistics of this industry were those issued by the U. S. Geological Survey for 1880, during which year the production reached 42,000 barrels; in the preceding ten years the amount produced amounted to 82,000 barrels. Since 1880 the production has steadily increased and will probably exceed 90,000,000 barrels for the year 1916. At the beginning of the manufacture of Portland cement in this country, practically all that was used was imported; the earliest statistics of the Geological Survey show an importation of 92,000 barrels in 1878, which steadily increased reaching a maximum of about 3,000,000 barrels in 1895, since which time it has decreased to 42,218 barrels in 1915. This has resulted from the improvement in the process of manufacture in this country which has decreased the cost and increased the quality until today American Portland cement is unexcelled. The American manufacturer is successfully competing in the world's markets; and there was exported in 1915 over 2,500,000 barrels. The preceding figures are taken from the annual reports of the statistics of the cement industry compiled and published by the U. S. Geological Survey.

The following has just been received from U. S. Geological Survey as of date January 1, 1917. "Another mineral product which furnishes an index of business conditions is cement, the 1916 production of which is estimated to be 5,000,000 barrels in excess of the output of the previous year, while the shipments were even greater, aggregating 94,500,000 barrels, with the outlook reported as good for the new year.

In addition to the governmental departments and other organizations previously mentioned which have taken important parts in developing standard specifications and tests for the manufacture and use of cement the following bodies working specifically in this field have coöperated in the improvement of this product and in bringing about a better understanding of the varied uses of cement and concrete.

1E1 American Concrete Institute

Secretary: Harold D. Hynds, 30 Broad Street, New York City.

Publications:

(*a*) Journal, containing the Proceedings of Annual Conventions including reports of committees and also the following:
(*b*) Proposed Standard Specifications.
(*c*) Recommended Practice.
(*d*) Standard Specifications Adopted.

The following is also issued separately as an authorized reprint from the copyrighted Journal:
(*e*) Standard Specifications.

Members receive (*a*) which may be purchased by others, cloth bound, for $10.50; paper, $10.

Founded in 1905 and incorporated in 1906 as National Association of Cement Users. Charter amended on July 2, 1913, and name changed to American Concrete Institute.

Its purpose is to increase and disseminate knowledge in regard to the use of cement, concrete and allied products; to conduct research into their properties and uses; and to formulate recommended practice and standard specifications. Its object is purely educational.

Any person engaged in the construction or maintenance of work in which cement is used, or qualified by business relations or practical experience to coöperate in the purposes of the Institute, or engaged in the manufacture or sale of machinery or supplies for cement users, or a man who has attained eminence in the field of engineering, architecture or applied science, is eligible for membership.

Standards: (See [*d*]). Sectional committees submit reports before Annual Conventions.

Proposed Recommended Practice and Specifications to be submitted to the Institute must be mailed to the members at least thirty days prior to Annual Convention, and as there amended and approved, passed to letter ballot, which shall be canvassed within sixty days thereafter, such Recommended Practice and Specifications shall be considered adopted unless at least 10 per cent of the total membership shall vote in the negative.

The standards adopted are referred to later under their special headings.

1E2 Portland Cement Association

General Manager: J. P. Beck, 111 West Washington Street, Chicago.

Organized as Association of Portland Cement Manufacturers in 1902. Name changed in 1904 to Association of American Portland Cement Manufacturers and in 1916, to Portland Cement Association. Headquarters moved from Philadelphia to Chicago in December, 1915.

Membership is voluntary and comprises about 93 per cent of the Portland cement producing capacity of the United States.

The Association employs a large number of engineers, architects and other specialists for the purpose of exploiting old and developing new uses for Portland cement. Considerable effort is expended in an endeavor to improve the quality of concrete work, both through advice as to proper specifications and actual supervision of work.

Employees of the Association and of member companies actively participate in the work of a large number of committees of engineering and other societies whose work directly or indirectly involves the testing and use of cement and concrete.

The Association, on September 1, 1916, entered into an agreement with Lewis Institute of Chicago for the operation of the Structural Materials Research Laboratory. This is an endowed institution with an attendance of 3,500 students and the purpose of this Laboratory is twofold: To carry out research work in the properties of concrete and concrete materials for the information of all users; and to give instruction to the students of this institution on the properties and uses of concrete.

Publications:

In connection with its work of investigation and promotion to increase the effective uses and output of cement, the Association issues (*a*) books, (*b*) bulletins and (*c*) circulars looking toward standardized processes. These are distributed without charge unless otherwise noted.

1E3 Cement Products Exhibition Company

Secretary; Blaine S. Smith, 210 S. La Salle Street, Chicago, Ill.

This company was organized for the purpose of holding national exhibitions to place before the people annually a record of the progress and achievements in the manufacture and use of cement and concrete. The ninth annual cement show will be given in Chicago from February 7 to 15, 1917.

1E4 Information Obtainable

The following are selected from sixty publications of the U. S. Geological Survey (2A1) as giving the most comprehensive development of the industry in general, the remaining publications referring chiefly to special districts. Those without prices affixed are free upon application to the Director; those priced may be purchased from the Superintendent of Documents, Government Office, Washington; those marked "Ex." are exhausted.

(*a*) "The Materials and Manufacture of Portland Cement," 1903, E. C. Eckel.

(*b*) "Cement Materials and Cement Industries of the U. S.," 1905, E. C. Eckel, Bulletin 243, 395 pp. 65 cents.

(*c*) "The American Cement Industry," 1905, E. C. Eckel, Bulletin 260. Ex.

(*d*) "Portland Cement Mortars and Their Constituent Materials; Results of Tests 1905 to 1907," R. L. Humphrey, Bulletin 331, 130 pp. 25 cents.

(*e*) "The Effects of the San Francisco Earthquake and Fire on Various Structures and Structural Materials," 1907, R. L. Humphrey, Bulletin 324, pp. 14–61. 50 cts.

(*f*) "The Effect of the San Francisco Earthquake on Buildings, Engineering Structures and Structural Materials," 1907, J. S. Sewell, Bulletin 324, pp. 62–130. 50 cents.

(*g*) "The Strength of Concrete Beams, Results of Tests Made at the Structural Materials Testing Laboratory," 1908, R. L. Humphrey, Bulletin 344, 59 pp. 10 cents.

(*h*) "Mineral Resources of the United States" (2A1. Part 2) for 1909 and for each subsequent year up to 1915. Chapters on cement, by E. F. Burchard. 75 cts. each bound volume.

(*i*) "Portland Cement Materials of the United States," with contributions by E. F. Burchard and others, 1913, Bulletin 522, 401 pp.

Other governmental contributions are:

(*k*) Bureau of Standards (1A2*c*), 1911, "The Strength of Reinforced Concrete Beams, Results of Tests of 333 Beams," by Richard L. Humphrey and Louis H. Losse.

(*l*) Ditto, No. 12, 1912, "Action of the Salts in Alkali Water and Sea Water on Cements," by P. H. Bates, A. J. Phillips and R. J. Wig.

(*m*) Ditto, No. 58, "Strength and Other Properties of Concrete as Affected by Materials and Methods of Preparation," by R. J. Wig, S. M. Williams and E. R. Gates.

(*n*) Ditto (1A2*c*), "Compressive Strength of Portland Cement Mortars and Concretes."

(*o*) U. S. Department of Agriculture, Farmers Bulletin No. 403, 1915; "The Construction of Concrete Fence Posts.

(*p*) U. S. Department of Agriculture, Farmers Bulletin No. 461, 1911; "The Use of Concrete on the Farm."

(*q*) U. S. Department of Agriculture, Farmers Bulletin No. 481 1912; "Concrete Construction on the Live Stock Farm."

In addition to which are the following:

(*r*) Inspection Dept., Associated Factory Mutuals Fire Insurance Companies (Serial No. 3), "Concrete Storehouse of Naumkeag Steam Cotton Co., which Successfully Withstood the Salem Conflagration." No. 37, 1914.

(*s*) American Concrete Institute (1E1) August, 1915. Report of the Committee on Edison Fire.

During the Louisiana Purchase Exposition, at St. Louis, in 1904, an investigation of the constituent materials of

Portland cement mortars and concretes was inaugurated; this was continued on a more extensive scale in the Structural Materials Testing Laboratories of the U. S. Geological Survey at St. Louis and Pittsburgh, and the results of 25,000 of these tests were published in Bulletin No. 331 of the Survey (1E4*d*). The Survey extended the work and in coöperation with the state geologists and others has continued the investigation, collecting for test samples of mine tailings, sands, gravels, crushed slag, and stone to determine their value as aggregate for concrete.

With the transfer of this work in 1910, the Bureau of Standards has joined in this coöperation, and the results of the investigations, some of which are being published in state reports, will be published by the Bureau as they accumulate.

The Bureau has published the completed study of 20,000 tests of Portland cement mortars and concretes from the many investigations, made by the Structural Materials Testing Laboratories of the Geological Survey and those by the Bureau of Standards (1E4*m*). The results show that several of the generally accepted methods for proportioning concrete mixtures are incorrect and that certain precautions are necessary in the fabrication of concrete to insure a product of known quality. The effect of different exposures while hardening, the effect of aging, and the effect of variation in the quantity of cement used, are discussed.

The relative value of various aggregates is shown, such as gravels, limestones, granites, trap rocks, cinders, sands, and stone screenings, also the relative value of round- and sharp-grained sands. Proper methods for testing and selecting aggregates are also suggested.

Other references to cement and concrete, too numerous to mention specifically, will be found in the Proceedings of the A.S.T.M. (1A4*b*), of the A.S.C.E. (1A5), of the Western Society of Civil Engineers (1A10), in the Journal of the A.C.I. (1E1*a*), and in other volumes and in the many monthly publications in which the cement and allied industries are featured.

1E5 Other References

(*a*) "Popular Handbook for Cement and Concrete Users," Myron H. Lewis and Albert H. Chandler.
(*b*) "Inspection of Concrete Construction," Jerome Cochran.
(*c*) "Concrete Construction, Methods and Costs," H. P. Gillette and Charles S. Hill.
(*d*) "Engineers' Pocket Book of Reinforced Concrete," E. Lee Heidenreich.
(*e*) "Building Superintendence and Construction," Frank E. Kidder.
(*f*) "Kidder's Pocket Book," pp. 235–240, 282–288, 816–818, 824–894, 905, 911–997.
(*g*) "Carnegie Pocket Companion, 1916," pp. 51–54, 118–129, 327–333 365–370.
(*h*) "Jones & Laughlin, Manual, 1916," pp. 80, 81, 132, 285, 289, 292.
(*j*) "Standard Specifications," J. C. Ostrup.
(*k*) "Design of Walls, Bins and Grain Elevators," M. S. Ketchum.
(*m*) "Handbook of Cost Data for Contractors and Engineers," H. P. Gillette.
(*n*) "Factories and Warehouses of Concrete," P.C.A. (1E2*a*).
(*o*) "The Concrete House and Its Construction," P.C.A. (1E2*a*).
See Industrial Section, pp. xi to xvi, xxxiv.

1E6 Practice Recommended

By American Railway Engineering Association (1A9*f*), 1916:
(*a*) "Specifications for Plain and Reinforced Concrete and Steel Reinforcement."
(*b*) "Designs of Reinforced Concrete Structures."
(*c*) "Monolithic Construction."
(*d*) "Waterproofing of Masonry."
(*e*) "Methods of Depositing Concrete under Water."
(*f*) "Methods of Repairing Defective or Worn Surfaces of Concrete."
By National Fire Protection Association (Serial No. 3).
(*g*) "Specifications for Construction of a Standard Building," Report of Committee on Fire Resistive Construction, 1913.
By National Board of Fire Underwriters (Serial No. 3).
(*h*) "Building Code Recommended by the N.B. of F.U.," Fourth Edition, 1915.
(*j*) "Dwelling Houses—A Code of Suggestion for Construction and Fire Protection," First Edition, 1916.

By American Concrete Institute (1E1*c* and).
(*k*) "Standard Recommended Practice for the Use of Reinforced Concrete." 21 pp. (No. 7.)
(*l*) "Standard Recommended Practice for Concrete Drain Tile." 3 pp. (No. 9.)
(*m*) "Standard Recommended Practice for Concrete Architectural Stone, Building Block and Brick." 4 pp. (No. 10.)
By American Society for Testing Materials (1A4*a*).
(*n*) "Form of Specifications for Certain Commercial Grades of Broken Stone."

(*o*) In addition to the foregoing there are many excellent publications of the Portland Cement Association (1E2) which are practical recommendations, many with diagrams, for the use of cement and concrete.
See Industrial Section, pp. xi to xvii, xxxii, xxxiv.

1E7 Standards adopted

(*a*) *Standard Specifications and Tests for Portland Cement, A.S.T.M.* (1A4). *Serial Designation C.9-17.*

The undersigned represented the American Institute of Architects at the last three annual meetings of the American Society for Testing Materials. The Institute was appointed a member of that Society's Standing Committee on Cement, and of the latter's Subcommittee on General Clauses.

The consideration of specifications for cement dates as far back as 1885, when a Special Committee of the American Society of Civil Engineers presented a report on "Uniform System of Tests of Cement;" the Committee of the American Society for Testing Materials on Standard Specifications for Cement did not come into being until 1902. This Committee in 1903 adopted as the basis for its work the methods of tests recommended by the Special Committee on Uniform Tests of Cement of the American Society of Civil Engineers. In order to obtain data to aid in drafting specifications, it also arranged a series of tests by some thirty prominent laboratories. The results of these tests were collated, and a specification was recommended by the Committee and adopted by the Society in 1904.

The American Railway Engineering and Maintenance of Way Association, upon the recommendations of its Committee on Masonry, adopted this specification in 1905, and the revisions in 1908 and 1909.

In 1912, a Board of Engineers was appointed to revise the specifications for cement of the U. S. Army. This Board later coöperated with a U. S. Departmental Conference in preparing a specification which was adopted by the U. S. Government by Executive Order, April 30, 1912. The American Society of Civil Engineers accepted the final report of its Special Committee on Uniform Tests of Cement, January 17, 1912. The American Society for Testing Materials adopted the revisions recommended by its Committee, August 16, 1912.

The effort to reconcile the differences in these recommendations led to the organization on October 24, 1912, of the Joint Conference on Uniform Methods of Tests and Standard Specifications for Cement, consisting of three representatives each appointed by the Board of Direction of the American Society of Civil Engineers, by the Committee on Standard Specifications for Cement of the American Society for Testing Materials, and by the U. S. Departmental Committee. After several years' work, this Conference reported recommended American Specifications and Methods of Tests for Portland Cement; these were considered by the several organizations of which the Conference was composed, further modifications made and specifications and Methods of Tests for Portland Cement to become effective January 1, 1917, were adopted by the American Society for Testing Materials, September 1, 1916; they were approved by the U. S. Departmental Conference, December 7, 1916, and were reported favorably by the representatives of the Board of Direction of the American Society of Civil Engineers, December 24, 1916.

There is now a single American specification and methods of test for Portland cement, with its attending advantages to the cement industry and to architects, engineers and others. With this standard now available all architects should encourage its use in every possible way and refer to it on all occasions relating to the use of Portland cement. —THOMAS NOLAN, *Chairman Institute Committee on Materials and Methods.*

These Standards will be found printed and illustrated in Book of A.S.T.M., 1916 (1A4*c*); also separately (1A4*e*); also published as a separate booklet for general distribution by the Portland Cement Association (1E2).

(*b*) *Joint Committee Report: Concrete and Reinforced Concrete.*

The final report of the Joint Committee on Concrete and Reinforced Concrete marks the completion of a highly important step in the standardization of the practice in the use of this very essential material of construction.

This work was undertaken more than twelve years ago when the Joint Committee was organized at Atlantic City, N. J., June 17, 1904, at the meeting of the several special committees representing the American Society of Civil Engineers, the American Society of Testing Materials and the American Railway Engineering and Maintenance of Way Association, initiative having been taken by the American Society of Civil Engineers at its annual convention at Asheville, N. C., June 11, 1903, by the adoption of the following resolution:

"It is the sense of this meeting that a special committee be appointed to take up the question of concrete and steel-concrete and that such committee coöperate with the American Society for Testing Materials and the American Railway Engineering and Maintenance of Way Association." There were subsequently added to this Committee, which now has a membership of twenty-eight, special committees representing the Association of American Portland Cement Manufacturers and the American Concrete Institute. Subcommittees were appointed to consider the various divisions of the subject, and their reports were considered at the thirty meetings attended by a majority of its members."

Progress reports were made in 1909 and 1912 and after consideration of the criticisms of these reports and study of new experimental data, the Joint Committee revised, to some extent, its previous recommendations on subjects not previously touched upon and adopted its final report July 1, 1916.

The recommendations of this Committee have a far-reaching influence; they form the basis of progressive municipal and state building regulations, the specifications and recommended practice of the American Railway Engineering Association, the Standard Building Regulations of the American Concrete Institute and similar standards.

The report is of inestimable value in standardizing the art, and every architect should have a copy for ready reference in designing structures of concrete and reinforced concrete.

The Joint Committee has performed a meritorious service, with care and thoroughness, and has more than justified its existence.

This pioneer work in the standardization of the art of concrete and reinforced concrete construction could only have been so satisfactorily performed by a committee thus constituted.—RICHARD L. HUMPHREY, *Secretary, Joint Committee.*

Reference will be made later as to where this report may be obtained.

EDITOR'S NOTE.—The inconsistencies in the requirements of varying building codes and ordinances in cities throughout the United States has frequently been pointed out by architects and engineers, and will be referred to under later serial numbers in the hope that the Structural Service Department may be of assistance in effecting through the coöperation of the municipalities and states uniform standards of practice in the use of concrete.

Other standards with reference to concrete and reinforced concrete are

(*c*) A.S.T.M. (1A4*c* and *e*) "For Billet-Steel Concrete Reinforcement Bars," Serial Designation A15–14.

(*d*) Ditto, "For Rail-Steel Concrete Reinforcement Bars," Serial Designation A16–14.

American Concrete Institute (1E1*c* and *e*.)

(*e*) "Standard Building Regulations for the Use of Reinforced Concrete." 13 pp. (No. 4.)

(*f*) "Standard Specifications for Scrubbed Concrete Surfaces." 3 pp. (No. 8.)

(*g*) "Standard Specifications for Concrete Architectural Stone, Building Block and Brick." 3 pp. (No. 11.)

(*h*) "Standard Building Regulations for the Use of Concrete Architectural Stone, Building Block and Brick." 3 pp. (No. 12.)

(*j*) "Standard Specifications for Portland Cement Stucco on Metal Lath, Brick, Tile or Concrete Block." 9 pp. (No. 15.)
(For other recommended practice as to stucco, see page xi.)

(*k*) "Standard Methods for the Measurement of Concrete Work." 7 pp. (No. 16.)

(See also "Standards" under 1E9.)

1E8 Current Activities

(*a*) *Investigations and Tests on Concrete and Other Columns.* Being conducted by the U. S. Bureau of Standards in coöperation with the Underwriters Laboratories and the Factory Mutuals Laboratories will be referred to under Fire-Prevention in Serial No. 3.

1E9 Concrete Fills (and Various Top Coats)

Without proper underfills or foundations for cement and composition flooring, for sidewalks, paving and other wearing surfaces, the surfaces cannot fulfil their functions as to stability and durability. Activities toward standardization of these foundational requirements have resulted in the following publications, specifications and standards:

(*a*) Office of Public Roads and Rural Engineering, United States Department of Agriculture (1B1*c*). Portland Cement Concrete Pavements for Country Roads, Bulletin 249.
(*b*) National Paving Brick Manufacturers' Association (Serial No. 2). Specifications for the Construction of Vitrified Brick Street Pavements and Country Roads; Green Concrete Foundation; Sand-Cement Superfoundation, and Sand Cushion Type.

Standards:

(*c*) American Concrete Institute: (1E1).
2. Standard Specifications for Portland cement sidewalks.
5. Standard Specifications for one-course concrete highway.
6. Standard Specifications for Portland cement curb and gutter.
13. Standard Specifications for plain concrete floors.
14. Standard Specifications for re-inforced concrete floors.
17–18. Standard Specifications for one and two-course concrete street pavements.
19. Standard Specifications for one-course concrete alley pavements.

(For other information and publication, see Industrial Section, page x.)

1E10 Treatment of Concrete Floors and Surfaces

(*a*) *Practice recommended.* See 1E6*f*.

(*b*) *Standards.* 1E7*f* and *j*. 1E9*c*13 and 14.

(*c*) *Experiments* have been started to determine a suitable material for treating the surface of concrete floors to prevent dusting and increase their durability. This work is part of a more comprehensive investigation which is now being outlined to determine proper methods of construction which will mitigate dusting. An abrasion machine has been designed for testing flooring materials which it is believed will give results comparable with the actual wear on floors, and plans have been made for extensive tests on various flooring materials. Results of this investigation probably will not be available for a year or two. (Report, Bureau of Standards, 1A2*a*).

(See also 1D1*g* and other references under 1D and industrial section, pp. x, xx.)

1F Structural Iron and Steel

From the earliest history of the industry the producers have, closely following first the leading members of the older societies abroad and then of those in this country, coöperated in developing the production of iron and steel to their present state. In addition to the governmental and other agencies already mentioned, the following organizations are to be noted as among those specifically concerned with development on the structural side. Others concerned with iron and steel in other metallic industries will be referred to in subsequent issues.

1F1 American Foundrymen's Association, Inc.

Founded 1896. Incorporated 1916.

Secretary: A. O. Backert, 12th and Chestnut Streets, Cleveland, Ohio.

Publications:

(*a*) Transactions, a bound volume containing the papers, addresses and discussions at the annual meeting.
(*b*) Pamphlets on papers and addresses at the annual convention.
(*c*) Yearbook containing the names of members and the by-laws.

Above are free to members, but may be purchased by others at (*a*) $5 each, (*b*) $5 annually, (*c*) $1.50 a copy.

The object is to promote knowledge in the production of castings, and its work is concerned chiefly with gray and malleable iron and steel foundry practice and does not consider non-ferrous metals.

At the annual meeting, committees submit reports which are, after discussion and adoption, printed in the proceedings.

Standards: Practically all of the standards adopted have first been sanctioned by the A.S.T.M. (1A4).

1F2 American Iron and Steel Institute

Secretary: James T. McCleary, 61 Broadway, New York City.

Publications:

Among these are:

(*a*) Monthly Bulletin, largely devoted to sociological subjects (housing, sanitation and recreation facilities for employees included).
(*b*) Yearbook, giving verbatim report of the proceedings of the general meetings.
(*c*) Annual Statistical Report.
(*d*) Special statistical bulletins, published from time to time during the year as advance copy from the annual statistical report.
(*e*) Iron and Steel Works Directory of the U. S. and Canada, published every few years, latest issue being 1916.

1F3 The Association of American Steel Manufacturers

Secretary-Treasurer: Frank A. Robbins, Jr., care of Pennsylvania Steel Co., Steelon, Pa.

Formed about 1895 to standardize the practices of the steel trade and its specifications. Many of the specifications of this Association have later been adopted in whole or in part by other associations and societies and in many cases this Association has gladly relinquished its claims to the original specifications when good use has been made of its pioneer work.

Officers and committees of this Association coöperate in current movements to standardize the specifications and requirements pertaining to steel in its many forms of manufacture and use.

Standards: In addition to the "standard specifications" for various other forms of manufactured steel, promulgated by this Association, the "Manufacturers' Standard Specifications for Structural Steel for Buildings" have for many years been referred to by architects and engineers to secure uniformity in estimating conditions and practice. While these are still often referred to, as they differ but slightly from the later standards (1F6) of the A.S.T.M., it is noted that the handbooks of steel companies print the latter specifications rather than the former ones, and, for the sake of uniformity, it is suggested that architects observe the recommendations contained in the introduction by Prof. Thomas Nolan to the A.S.T.M. standards.

1F4 Information Obtainable

A voluminous literature upon structural design and practice exists, but this lies outside our province. A carefully prepared bibliography or specific recommendations will be sent in answer to inquiries where needs are carefully stated.

Reference Handbooks:

"Engineers' Pocketbook," J. C. Trautwine.
"The American Civil Engineers' Pocketbook," Mansfield Merriman.
"Kidder's Pocketbook, 1916."
"Civil Engineers' Pocketbook," Albert I. Frye.
"Structural Designers' Handbook," Wm. Fry Scott.
"Properites of Steel Sections," John C. Sample.
"Curves for Calculating Beams, Channels and Reactions," Sidney Diamant.
"Tables of Stresses in Roof Trusses," H. C. Hearne.
"Structural Engineers' Handbook," Milo S. Ketchum.
"Handbook Containing General Information for the Use of Engineers, Architects and Builders, 1915," Lackawanna Steel Company.
"Manual, 1916," Jones & Laughlin.
"Handbook of Information Relating to Structural Steel, 1916," Cambria Steel Company.
"Catalogue of Bethlehem Structural Shapes," edition of 1911. Bethlehem Steel Company.
"Pocket Companion, 1916," Carnegie Steel Company.

1F5 Practice Recommended

(*a*) "Cast Iron Columns, Bases and Lintels," Building Code, 1915. By N. B. F. U. (Serial No. 3).

"*Fabrication of Steel Structures.*" No standards have been officially adopted but the following are in general use:

(*b*) "Specifications for Steel Structures, Design, Details of Construction and Workmanship." Adopted, 1912. American Bridge Company. Printed in Carnegie "Pocket Companion," 1916, pp. 154–161. Also in Standard Specifications, distributed by Carnegie Steel Company.

(*c*) "Standard Specifications for Fabricated Steel Building Construction." Adopted, 1915. Jones & Laughlin "Manual, 1916," pp. 370–377. Jones & Laughlin.

(*d*) "Instructions for the Mill Inspection of Structural Steel," A.R.E.A. (1A9).

(*e*) "Steel Construction," N.B.F.U. (Serial No. 3). Building Code, 1915.

Angles: The Association of American Steel Manufacturers recommend that certain sections of angles be considered as standard for general building construction and other work. These angles are usually indicated in the steel companies' handbooks by a different-faced type; the use of same, whenever possible, instead of avoidable variations, will tend toward economy in construction through lessening costs of rolling and carrying in stock sizes infrequently called for.

1F6 Standards

(*a*) *Standard Specifications for Structural Steel for Buildings A.S.T.M. Serial designation A9–16.*

The specifications from which the present standards have developed were first framed and recommended in May, 1900, by that Society, which was then known as the American Section of the International Association for Testing Materials. They were issued in a bulletin which was accompanied by a table epitomizing the salient features of forty different representative specifications of that period, among which in addition to city and many railway engineering adopted specifications was the "Standard Specifications for Structural Steel" of the Association of American Steel Manufacturers. This Association did good pioneer work in its efforts to standardize the specifications and practices of the steel trade.

The Standard Specifications for Structural Steel for Buildings were, as above stated, originally premised by the A.S.T.M., on a careful comparative study of the leading specifications then (1900) in use by railroads, municipalities, consulting engineers, and the American Railway Engineering Association, the Association of American Steel Manufacturers, and others. Since their original adoption in 1901, they have been revised four times, in 1909, 1913, 1914, and 1916, in order to keep them abreast of the progress of the times.

"In these standard specifications will be noted what are termed the permissible variations in the rolling of plates, shapes and bars, and provision should be made in the design to care for such variations. A design which does not permit of this variation is frequently the cause of serious difficulties. Ample clearances tend toward ease and economy in fabrication and greater facility in the erection of any structure."

These specifications are the standards that should be generally followed throughout the United States, and the members of the Institute and all others interested in promoting the very best usages in materials and methods of construction should urge their universal adoption.—THOMAS NOLAN, *Chairman A.I.A. Committee of Materials and Methods.*

These standards will be found printed and illustrated in the book of A.S.T.M. Standards, 1916 (1A4*c*); also separately (1A4*e*) also printed and illustrated, together with bridge and other standard specifications, in Carnegie "Pocket Companion, 1916," pp. 10–15; also in Jones & Laughlin "Manual, 1916," pp. 342–347; also in "Standard Specifications," distributed by Carnegie Steel Company.

(*b*) By A.S.T.M. (1A4*c* and *e*), For Malleable Iron Castings.
(*c*) By A.S.T.M. (1A4*c* and *e*), For Gray-Iron Castings.
(*d*) By A.S.T.M. (1A4*c* and *e*), For *Billet Steel Concrete Reinforcement Bars.*
(*e*) By A.S.T.M. (1A4*c* and *e*), For Rail-Steel Concrete Reinforcement Bars.

1F7 Current Activities

(*a*) An important investigation, in progress for a number of years and of value to the engineering and architectural professions, consists of two series of column tests which the Bureau of Standards is making in coöperation with the steel column committees of the American Society of Civil Engineers and of the American Railway Engineering Association.

The series of columns recommended by the American Society of Civil Engineers originally comprised nine different types of cross-section. Each type was represented by what was called a light section and a heavy section, and in both the light and the heavy section of each type there were three columns of each of three different lengths.

The American Railway Engineering Association columns originally comprised eighteen latticed columns with rectangular bearing plates at both ends. As in the American Society for Civil Engineers' series, both light and heavy sections, each with three different lengths, were tested, three columns for each length.

Tests upon these two original series have been com-

pleted. A considerable addition has been made to the original American Society of Civil Engineers' program. In order to obtain a relation, if possible, between the ultimate strength and the slenderness ratio, additional columns, totaling thirty-six, have been selected, having such areas, cross-sections and lengths that the slenderness ratio will be different from those embraced in the original series. . . . Twenty-four columns have been added to the series of the American Railway Engineering Association. . . .

The purpose of these tests is to determine the best form of cross-section of columns and also to correct or confirm the formulas used by engineers and architects for calculating the strength of columns. Not alone are such formulas valuable for determining the loads which can safely be carried by the columns used in various structures, but they also enable the designer of columns to make the most economical use of the steel employed in their construction.

The investigation upon columns will be augmented by the addition of about 250 columns which have been in the possession of the Watertown Arsenal and which will be transferred to the Bureau. (Report, Bureau of Standards, 1916 (1A2*a*).

(*b*) Other tests being conducted in coöperation between the Bureau and the Underwriters Laboratories and Associated Factory Mutuals Laboratories, with reference to columns and beams under fire tests with different protectional coverings will be referred under a later serial number.

1F8 Preservation of Iron and Steel

The preservation of iron and steel is a very broad problem. The endurance of steel structures depends not only on good materials but on good methods used for their preservation. The following list covers the theory of corrosion, materials used for the protection of steel, their application and manufacture with a logical subdivision into three classes. The most recent investigational work in the United States, done under the auspices of the A.S.T.M. (referred to in a later issue of the Journal in connection with the Paint Manufacturers' Association of the United States), is recorded in the annual volumes of the Proceedings of the American Society for Testing Materials (1A4*a* and *b*) and will also be found in the works of Cushman and Gardner. The annual reports of Committee D1, A.S.T.M., on "Protective Coatings for Structural Materials," from 1903 to 1914 inclusive, are very valuable and are published by the A.S.T.M. in the form of a single volume of 557 pages which may be obtained from the Secretary at the price of $3.50.

A. Corrosion of Steel.

(1) "Corrosion and Preservation of Iron and Steel," Cushman and Gardner.
(2) "Corrosion of Iron and Steel," Alfred Sang.
(3) "Corrosion of Iron and Steel," J. N. Friend.
(4) "An Electrolytic Method of Preventing Corrosion of Iron and Steel," by J. K. Clement and L. V. Walker, Bureau of Mines (2).
(5) "Corrosion of Fence Wire," Bulletin 239, U. S. Department of Agriculture.
(6) "Electrolytic Corrosion of Iron in Soils," U. S. Bureau of Standards (1A2*c*), No. 25.

B. Protective Coatings.

"Paints for Steel Structures," Houston Lowe.
"Rustless Coatings," M. P. Wood.
"Iron Corrosion, Anti-fouling and Anti-corrosive Paints," Arthur S. Jennings.
"Lead and Zinc Pigments," C. D. Holley.
"The Preparation and Uses of White Zinc Paints," P. Fleury.
"White Paints and Painting Materials," W. G. Scott.

C. Manufacture of Oils and Pigments.

"Chemistry and Technology of Paints," 2nd edition, Maxmilian Toch.
"The Manufacture and Comparative Merits of White Zinc and Zinc White Paints," G. Petit.
"Linseed Oil and Other Seed Oils," Wm. D. Ennis.
"Paint Technology and Tests," Henry A. Gardner.

Other References: See Reference Hand Books 1F4. For additional information and other publications relating to preservative coatings for structural iron and steel, see Industrial Section, pp. xii, xviii, xix, xx.

The subjects of corrosion, protection and preservation of iron, steel and other metals as applied to other products will be treated under the respective industries.

ROBERT W. HUNT & COMPANY

CHICAGO, ILLINOIS, AND IN THE PRINCIPAL CITIES OF THE UNITED STATES, CANADA AND EUROPE

Pioneers in their profession, Robert W. Hunt & Company maintain an International Bureau of Inspection, Tests and Consultation, composed of competent and experienced Engineers, Chemists, Metallurgists and Inspectors who are permanently employed in the divisions of Engineering and Inspection, and in the various Laboratories.

The Company maintains offices in the principal cities of North America and Europe. Resident members of the organization are in charge of these offices, and resident inspectors are maintained at all of the leading industrial centers of the countries in which these offices are located. The personnel of the present technical organization is the result of continuous conservative Engineering work during the past quarter of a century in the business of Inspection, Tests and Consultation.

Members of this firm were, even prior to the organization of Robert W. Hunt & Company, intimately associated with the Iron and Steel Industry in America. This long and successful service affords the assurance that any work entrusted to the Organization relating to the Metallurgy, Manufacture, Inspection, and Testing of Steel and Iron Products will receive the most thorough and careful attention. The developmental period of reinforced concrete construction lies within the life of the company, and, from the beginning, the testing of cement and other concrete materials, checking of plans, and supervision of construction has received continuous and ever-widening application.

The divisions of the Organization and their Departmental Sub-Divisions are as follows:

Engineering
- Examinations and Reports
- Consultation and Checking of Plans
- Construction and Testing

Inspection
- Structural Steel
- Rails, Fastenings, Cars and Locomotives
- Materials of Construction

Laboratory
- Chemical
- Physical
- Electrical
- Cement
- Micro-Photography

The knowledge, experience and ability, and the accumulated data of the various divisions of the Organization, are the property of all divisions, and are made use of freely in the interests of their clients. Highly specialized skill of many kinds has been welded into practical coöperation, capable of effective and rapid performance.

This effective coöperation enables the Engineering Division to make investigations and to solve Engineering problems in the most efficient manner.

The Inspection Service is under the direct supervision of the Engineering Staff, located at the various general offices, and engineering advice in connection with inspection work is freely extended.

The Laboratory Service maintained at all of our offices is an effective supplement to the work of the Engineering and Inspection Divisions. Over six hundred employees are regularly in the exclusive service of the company, and depression in general business conditions exercises little effect in their number or location. To properly serve their clients at all times, the Organization must be kept intact, and many men have been continued in their positions during months of idleness of the mills and shops where they are located. This policy, reinforced by salaries commensurate with the responsibility they are called upon to bear, has ensured the loyalty and absolute fidelity required in the performance of judicial functions.

The steady growth of the Organization indicates that such ideals are heartily supported by the Architectural profession, and further have established recognition of the Testing Engineer in ethical brotherhood with the other specialized branches of professional structural activity.

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